

## PATENT ABSTRACTS OF JAPAN

(11)Publication number : 11-221828

(43)Date of publication of application : 17.08.1999

(51)Int.Cl.

B29C 33/36  
B29C 45/04  
// B29L 31:60

(21)Application number : 10-235623

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(22)Date of filing : 21.08.1998

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(30)Priority

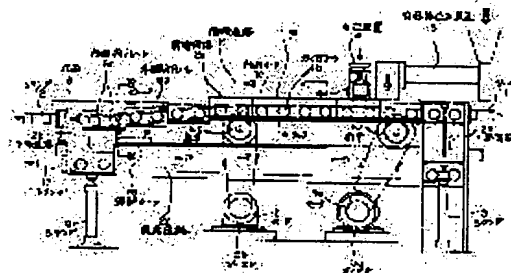
Priority number : 09331895 Priority date : 02.12.1997 Priority country : JP

## (54) CONTINUOUS MANUFACTURE OF MOLDING AND DEVICE THEREFOR

(57)Abstract:

PROBLEM TO BE SOLVED: To automatically mass-produce moldings by slightly detaching molds downward to remove moldings from the molds during the coagulation of a solid solution injected into the molds while the molds move toward the end of a forward passage, and making the molds which are set free at the end of the forward passage descend right under the end moving the molds back upto a spot right under the starting point of the forward passage to make the molds ascend.

SOLUTION: A catapillar-type array of a plurality of molds 1 begins moving along a circulatory stroke. A solid solution is injected into individual molds passing through the device 3 for manufacturing moldings continuously by a squeeze-out type solid solution injection device 3 provided on the upstream side of a forward passage 2a. Simultaneously with the start of coagulation of the solid solution by cooling, the molds 1 are removed from moldings A. The molds 1 which reach the terminal part of a removing step are received by a cylinder 9 which ascends by a signal sensing the approach of the molds 1, and are made to descend to the height of an entrance for a backward passage 2c to be sent into the entrance of the backward passage 2c by a cylinder 13. The molds 1 reaching an ascending passage 2d after passing through the backward passage 2c are received by a cylinder 10 and are made to ascend to the height of an entrance for the forward passage 2a.



## LEGAL STATUS

[Date of request for examination]

27.09.1999

[Date of sending the examiner's decision of

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**CLAIMS**

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[Claim(s)]

[Claim 1] By pouring in the solid solution one by one and making it solidify to two or more metal mold remitted to the endless track type through which it circulates in the state of a matrix It is the approach of manufacturing many casts with which the bottom edge was wide opened through the cast top plating continuously as a continuation molding object connected forward and backward. The extrusion impregnation process of pouring in the solid solution to this metal mold during migration toward the terminal point of this migration from the starting point of the outward trip in which said two or more metal mold carries out advance migration, As the poured-in this solid solution solidifies as a cast, it goes from an adhesion condition with this cast caudad one by one to each metal mold. By [ slight ] making it break away a dimension every The sampling process which samples said continuation molding object from said metal mold, and the downward process which descends the metal mold released from the sampling process at the terminal point of said outward trip directly under a terminal point location, The return process which goes metal mold astern along with the return trip which it was made to incline downward [ a condition or downward ] near a \*\*\*\* horizontal, and was prepared from the location which descended, and which carries out go-astern migration, and returns to the directly under location of the starting point of said outward trip, The continuation manufacture approach of the cast characterized by consisting of a rise process which goes up said metal mold from this directly under location to the starting point location of said outward trip right above.

[Claim 2] By pouring in the solid solution one by one and making it solidify to two or more metal mold remitted to the endless track type through which it circulates in the state of a matrix A conveyance means of metal mold to be equipment which manufactures continuously many casts with which the bottom edge was wide opened through the top plating cast as a continuation molding object connected forward and backward, to make a single string continue mutually in the state of adhesion, and to convey said two or more metal mold horizontally, The extrusion injector which is arranged above the metal mold conveyance starting position of the conveyance means of this metal mold, and pours in the solid solution to this metal mold that carries out advance migration, The pressurizer which adjoins this extrusion injector, is arranged to a metal mold conveyance-side, presses the top face of the solid solution poured in into metal mold by the predetermined pressure, and is continuously fabricated to a flat field, A guide means to guide metal mold below gradually using the conveyance force of metal mold, The continuation manufacturing installation of the cast characterized by having a draw means to make two or more knock out pins which can appear freely frequently in a cavity project from an inferior surface of tongue upward to migration in the lower part of this metal mold corresponding to the reverse sense, and a circulation means of metal mold to circulate the sampled metal mold to the conveyance starting position of said metal mold.

[Claim 3] Continuation manufacturing installation of the cast according to claim 2 with which it is equipped free [ rotation of the roller guided for said guide means at said metal mold so that it may continue in the level condition according to an individual through between ahead movement by the condition of the medial axis which meets in the advance direction of metal mold when said metal mold goes caudad one by one from an adhesion condition with a cast in accordance with said guide means, a level condition is mostly maintained with addressing omission \*\*\*\*\* to few dimensions and it moves forward and may hold ].

[Claim 4] The continuation manufacturing installation of the cast according to claim 2 or 3 with which the means which carries out the load of the pressing force of the direction which continues at the specific

section with the molding process which carries out advance migration while impregnation of said solid solution is performed, and is mutually stuck from order to two or more metal mold under migration is established.

[Claim 5] The continuation manufacturing installation of the cast according to claim 2 or 3 with which the back end side of this metal mold in the condition of said metal mold having circulated and having returned to said metal mold conveyance starting position, and the pressing mechanism for forcing between the front end sides of other metal mold mutually in the adhesion direction from order in the terminal point location of said advance migration are formed.

[Claim 6] The continuation manufacturing installation of the cast according to claim 2 which two or more knock out pins implanted said knock out pin towards the middle plate side which drilled two or more pin holes penetrated possible [ frequent appearance in said cavity ], and this middle plate side, and was constituted from a rise-and-fall plate which can attach and detach within the limits of predetermined to the middle plate while blockading the whole surface of the shuttering which consists said metal mold of a cavity corresponding to said cast, and this shuttering.

[Claim 7] So that it may equip with an inside roller and an outside roller respectively free [ rotation ] before and behind the both-sides side of said metal mold, and metal mold may be maintained horizontally and it may move below gradually towards the front While arranging the inside guide rail to which it shows said inside roller, and the outside guide rail to which it shows said outside roller, respectively Either the rail for maintaining that it is movable and horizontally said rise-and-fall plate of said metal mold, or a maintenance roller The inferior surface of tongue or said internal and external guide rail of a rise-and-fall plate is met, and it is the continuation manufacturing installation of a cast according to claim 3 or 6 which established another side in the inferior surface of tongue of the lower part or said rise-and-fall plate along with said internal and external guide rail caudad.

[Claim 8] While arranging the elevator style which goes up and down perpendicularly in the termination location of an inside-and-outside guide rail in the terminal point location of said advance path, and descends in support of said metal mold By making the downward location of this elevator style into the starting point, turn back the guide orbit it can run [ that installation of the internal and external roller of said metal mold is possible, and ] horizontally in parallel with said advance path, and it is arranged. The continuation manufacturing installation of the cast according to claim 3 or 7 which arranged the elevator style which puts side by side the band conveyor for conveyance of said metal mold in accordance with this guide orbit, and goes up from the termination of said guide orbit to the starting point location of said advance path in support of said metal mold.

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**DETAILED DESCRIPTION**

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the approach of manufacturing continuously many casts with which the pars basilaris ossis occipitalis was wide opened through the cast top plating as a continuation molding object connected forward and backward, and its manufacturing installation.

[0002]

[Description of the Prior Art] For example, the injection molding approach well-known as a method and injection molding equipment which are performed from the former are common as the method of manufacturing the cast of the honeycomb structure which opened upper limit wide, or equipment. Since actuation is carried out by the basis of an easy and positive procedure so that it may be known well, this kind of the manufacture approach or a manufacturing installation has the advantage that a reliable cast is obtained, can employ that advantage efficiently depending on an application, and is used as the high approach and equipment of an availability.

[0003]

[Problem(s) to be Solved by the Invention] Although the aforementioned conventional manufacture approach and a manufacturing installation can fully employ the advantage efficiently by the application For example, if it puts in another way when manufacturing very a lot of casts very much moreover comparatively cheaply for a short time has the demand to a cast When priority is given to a volume, time for delivery, or a cost cut over the demand about precision, such as a geometry of a cast, by the aforementioned conventional manufacture approach or the manufacturing installation, correspondence is difficult absolutely and the so-called examination of mass-production method installation is needed from it.

[0004] When an example is given, there is grass personal protective equipment of the grass parking lot by which the arrival eye is carried out the other day as an application of the cast A of the honeycomb structure shown in drawing 2 . As the grass personal protective equipment which consists of a cast A of honeycomb structure is covered with and put on the whole surface and a car is parked on it, directly, it is made for the tire of a vehicle not to force grass, it has it, and this grass personal protective equipment aims at protection and its training of the grass in a parking lot, when parking a car at a grass parking lot. In the case of the cast of the honeycomb structure used for such an application, it is certain that priority is given to cast supply of an amount first huger than the demand about the improvement in precision of the geometry to a cast etc., and promotion of manufacture speed, and the demand to a cast is difficult to correspond by the conventional injection molding method to such a demand. That is, in order to rearrange the manufacture approach of the cast of honeycomb structure, or a manufacturing installation to the method which can respond to the above demands, it is necessary to throw away the conventional injection molding method, for example, to adopt the continuous manufacture method by the extrusion method.

[0005] It aims at offering the continuation manufacture approach and the equipment of the cast which can realize mass-production-method organization of automatic system by this invention having been made in view of the above-mentioned fault point, improving the trouble on the mass-production-method organization establishment resulting from equipment being an injection-molding method conventionally, adopting the circuit system by application of the knockout method of the solid solution, and two or more metal mold, and enabling implementation of a continuation manufacture method.

[0006]

[Means for Solving the Problem] The manufacture approach of this invention concerning claim 1 for solution of the above-mentioned technical problem By pouring in the solid solution one by one and making it solidify to two or more metal mold remitted to the endless track type through which it circulates in the state of a matrix It is the approach of manufacturing many casts with which the bottom edge was wide opened through the cast top plating continuously as a continuation molding object connected forward and backward. \*\* The extrusion impregnation process of pouring in the solid solution to this metal mold during migration toward the terminal point of this migration from the starting point of the outward trip in which said two or more metal mold carries out advance migration, As the poured-in this solid solution solidifies as a cast, it goes from an adhesion condition with this cast caudad one by one to each metal mold. \*\* By [ slight ] making it break away a dimension every The sampling process which samples said continuation molding object from said metal mold, and the downward process which descends the metal mold released from the sampling process at the terminal point of the \*\* aforementioned outward trip directly under a terminal point location, \*\* The return process which goes metal mold astern along with the return trip which it was made to incline downward [ a condition or downward ] near a \*\*\*\* horizontal, and was prepared from the location which descended, and which carries out go-astern migration, and returns to the directly under location of the starting point of said outward trip, \*\* It is characterized by consisting of a rise process which goes up said metal mold from this directly under location to the starting point location of said outward trip right above.

[0007] According to the manufacture approach concerning this invention which has the above-mentioned configuration, with the gestalt of the continuation molding object connected forward and backward through the top plating cast by coincidence in many casts with which the end (whole surface) was opened wide, many casts can be continuously manufactured from an extrusion type injector by carrying out sequential impregnation of the solid solution at metal mold, consequently mass-production-method organization can be realized. Thereby, the manufacturing cost of a cast can be lowered sharply.

[0008] The manufacturing installation of this invention concerning claim 2 for solution of the above-mentioned technical problem By pouring in the solid solution one by one and making it solidify to two or more metal mold remitted to the endless track type through which it circulates in the state of a matrix A conveyance means of metal mold to be equipment which manufactures continuously many casts with which the bottom edge was wide opened through the cast top plating as a continuation molding object connected forward and backward, to make a single string continue mutually in the state of adhesion, and to convey said metal mold of a plurality horizontally, b) The extrusion injector which is arranged above the metal mold conveyance starting position of the conveyance means of this metal mold, and pours in the solid solution to this metal mold that carries out advance migration, c) The pressurizer which adjoins this extrusion injector, is arranged to a metal mold conveyance-side, presses the top face of the solid solution poured in into metal mold by the predetermined pressure, and is continuously fabricated to a flat field, d) A guide means to guide metal mold below gradually using the conveyance force of metal mold, It has a draw means to make two or more knock out pins which can appear freely frequently in a cavity project from an inferior surface of tongue upward to migration in the lower part of this metal mold corresponding to the reverse sense, and a circulation means of metal mold to circulate the metal mold e Sampled to the conveyance starting position of said metal mold.

[0009] Since the manufacture approach concerning claim 1 can be enforced certainly according to the manufacturing installation according to claim 2 concerning the above-mentioned configuration and also it can fabricate continuously by carrying out easy [ of two or more metal mold of a fixed form ], and circulating them Since the cast which two or more knock out pins were made to project in the cavity of metal mold corresponding to the reverse sense to drop metal mold gradually, and carried out cooling solidification with the guide means is sampled while the manufacturing cost of metal mold becomes comparatively cheap, mold omission is performed certainly.

[0010] It is desirable to equip with the guide idler guided for said guide means at said metal mold so that it may continue in the level condition according to an individual through between ahead movement by the condition of the medial axis which meets in the advance direction of metal mold when [ according to claim 3 ] said metal mold goes caudad one by one from an adhesion condition with a cast in accordance with [ like ] said guide means, a level condition is mostly maintained with addressing omission \*\*\*\*\* to few dimensions and it moves forward and may hold, enabling free rotation.

[0011] According to the manufacturing installation according to claim 3, by composition with migration of a \*\*\*\* horizontal direction, and migration of the direction of a vertical for sampling actuation, the locus of migration of metal mold while moving a sampling process becomes possible [ regulating this horizontally powerfully ] to the inclination which is easy to serve as a posture of slanting facing down according to an individual sometimes, and can hold the posture of metal mold into a horizontal posture. The evil by the posture of metal mold turning into a posture of slanting facing down When going caudad and sampling metal mold from that there is a possibility that coagulation may start with the condition which is not level, and the configuration of a cast may become badly made in the condition that the poured-in solid solution has not solidified completely, and a cast, It is the direction of the friction surface on which it slides mutually not agreeing with the direction of a vertical, therefore being unable to perform smooth sampling actuation easily etc. These problems can solve all very easily by continuing and holding the medial axis of the metal mold in a sampling process in the level condition according to an individual through between these migration. [0012] It is desirable to establish the means which carries out the load of the pressing force of the direction which continues at the specific section according to claim 4 with the molding process which carries out advance migration while impregnation of said solid solution is performed like, and is mutually stuck from order to two or more metal mold under migration.

[0013] According to the manufacturing installation according to claim 4, impregnation of the solid solution is performed in a certain specific section in a molding process, but Although there is a possibility that the contact surface between metal mold before and after adjoining with the transfer pressure at that time may estrange mutually, a clearance may be generated in the meantime, and the solid solution may leak and come out outside from the clearance By restricting the stroke section before and after performing impregnation of the solid solution by the configuration of this claim, and carrying out the load of the pressing force of the direction mutually stuck from order, the exsorption to the exterior from said clearance can be prevented, and it becomes possible to carry out impregnation actuation of the solid solution safely certainly.

[0014] It is desirable to form the back end side of this metal mold in the condition according to claim 5 of said metal mold having circulated and having returned to said metal mold conveyance starting position like, and the pressing mechanism for forcing between the front end sides of other metal mold mutually in the adhesion direction from order in the terminal point location of said advance migration.

[0015] According to the manufacturing installation according to claim 5, to all the metal mold of the molding process in the upper part location in the circulation path of metal mold by forcing between the front end side and back end side mutually in the adhesion direction from order It becomes possible to continue operation of equipment to each actuation of balking of the metal mold in the downward process performed in the middle of a circulation process, or a return of the metal mold to a manufacture starting position, without barring the smooth nature of circulation migration of metal mold.

[0016] Like, said knock out pin can be implanted towards the shuttering [ which consists said metal mold of a cavity according to claim 6 corresponding to said cast ], and middle plate side which drilled two or more pin holes which two or more knock out pins penetrate possible [ frequent appearance in said cavity ] while blockading the whole surface of this shuttering, and this middle plate side, and it can constitute from a rise-and-fall plate which can attach and detach within the limits of predetermined to a middle plate. In addition, needless to say, the middle plate which blockades the whole surface of shuttering and this shuttering can be formed in one.

[0017] According to the manufacturing installation according to claim 6, the structure of metal mold is easy, since a rise-and-fall plate consists of structure where it is together put possible [ attachment and detachment ] within the limits of predetermined, and a knock out pin appears frequently in a cavity, to a middle plate, handling is easy and the draw of a cast is also performed easily. [0018] So that it may equip with an inside roller and an outside roller respectively free [ rotation ] before and behind the both-sides side of said metal mold, and metal mold may be horizontally maintained like the publication to claim 7 and it may move below gradually towards the front While arranging the inside guide rail to which it shows said inside roller, and the outside guide rail to which it shows said outside roller, respectively Along with the inferior surface of tongue or said internal and external guide rail of a rise-and-fall plate, another side can be established in the inferior surface of tongue of the lower part or said rise-and-fall plate along with said internal and external guide rail at the lower part for either the rail for maintaining that it is movable and horizontally said rise-and-fall plate of said metal mold, or a maintenance roller.

[0019] Since shuttering and a middle plate descend to coincidence along with a guide rail while being sent [ according to the manufacturing installation according to claim 7 ] to the front in addition to the operation by equipment according to claim 3, a rise-and-fall plate being horizontally maintained by the cooperativity of a maintenance roller and a rail, two or more knock out pins implanted in the rise-and-fall plate project gradually in the cavity, and a cast is extracted from the shuttering of metal mold.

[0020] While arranging the elevator style according to claim 8 which goes up and down perpendicularly in the termination location of an inside-and-outside guide rail in the terminal point location of said advance path, and descends in support of said metal mold like By making the downward location of this elevator style into the starting point, turn back the guide orbit it can run [ that installation of the internal and external roller of said metal mold is possible, and ] horizontally in parallel with said advance path, and it is arranged. In accordance with this guide orbit, the band conveyor for conveyance of said metal mold can be put side by side, and the elevator style which goes up from the termination of said guide orbit to the starting point location of said advance path in support of said metal mold can be arranged.

[0021] After according to the manufacturing installation according to claim 8 dropping the metal mold conveyed to the terminal point location of an advance path at elevator guard and conveying it to termination on a band conveyor in accordance with a level guide orbit, metal mold can be certainly returned to the starting point location of an advance path by the elevator style.

[0022]

[Embodiment of the Invention] Hereafter, the gestalt of the operation about the continuation manufacture approach and this manufacturing installation of a cast concerning this invention is explained in detail below based on a drawing.

[0023] The general drawing showing the outline of the continuation manufacturing installation of the cast which drawing 1 requires for this invention, the perspective view showing the cast of the honeycomb structure as an example of the cast with which drawing 2 is manufactured by the manufacturing installation of drawing 1 , metal mold [ in / in drawing 3 (a) / the III-III line position in drawing 1 ] and the sectional view of the circumference of it, and drawing 3 (b) are the sectional views cut by the I-I line of drawing 3 (a), and drawing 4 is the sectional view of the metal mold in the IV-IV line position in drawing 1 , and the important section of the circumference of it.

[0024] In drawing 1 , by this example, metal mold 1 is the thing of the configuration corresponding to the cast A of honeycomb structure with which the barrel of the shape of a hexagon of the upper limit disconnection shown in drawing 2 continues, and consists of predetermined die length (for example, 200mm) by predetermined width of face (for example, 1000mm). It is arranged by the condition of the matrix of the endless track type which turns upward the field where two or more of the metal mold 1 was opened wide, and circulates through it, and circulation migration is carried out along the circulation path 2 with the various mold migration means established in the middle of the circulation path 2. Rack 1a is prepared in base both sides, and, as for metal mold 1, the inside rollers 1c and 1c of a pair are formed in the right-and-left location of anterior part in the outside rollers 1b and 1b of a pair, and a hind right-and-left location. As for outside roller 1b and inside roller 1c, the difference (an inside location and outside location) is prepared in the amount of protrusions to the side in the same height. By this configuration, metal mold 1 can be gradually dropped in a sampling process, always holding the posture of metal mold 1 into a horizontal posture by the below-mentioned inside-and-outside guide-rail 8a and 8b, and inside-and-outside roller 1b and 1c.

[0025] The circulation path 2 consists of go-astern path 2c and 2d of rise paths as advance path 2a as an outward trip, downward path 2b, and a return trip. The solid-solution injector 3 of an extrusion type is for being prepared in the upper location in advance path 2a, and carrying out extrusion impregnation of the solid solution (for example, vinylchloride resin solution) which has a fluidity as a raw material of Cast A from the upper part to the metal mold 1 to pass. A pressurizer 4 is for applying a pressure from a crowning equally to the solid solution before [ the solid-solution injector 3 ] it is immediately prepared in the downstream (front) and coagulation starts, and offers pivotable press roller 4a.

[0026] 5a and 5b are the boosters of a pair, in this example, were prepared in the location which separated spacing before and after being equivalent to five pieces of metal mold 1, and have offered the gears 6a and 6b which mesh with rack 1a which metal mold 1 offers, respectively. Gearing 6a is driven by motor 7a with comparatively large (or rotational speed is quick) torque, and gearing 6b is driven by motor 7b with comparatively small (or rotational speed is slow) torque. According to the output difference (or bearer rate

difference) of motor 7a and motor 7b, the load of the pressing force of the direction mutually stuck between each metal mold 1 to drive can be carried out.

[0027] Outside guide-rail 8b and inside guide-rail 8c are prepared in the right-and-left both-sides side of advance path 2a, respectively. Outside guide-rail 8b is for regulating and holding the height location of outside roller 1b which metal mold 1 offers, and inside guide-rail 8c is for regulating and holding the height location of inside roller 1c which metal mold 1 offers. Thus, by holding the height location of each roller 1b and 1c of metal mold 1, while metal mold 1 passes a sampling process, the condition of the medial axis which meets in the migration direction of metal mold 1 can be continued and held in the level condition according to an individual through between these migration.

[0028] Go-astern path 2c is a path (return trip) for reversing metal mold 1 from the location which descended through downward path 2b. By constituting go-astern path 2c in a trunk mold, or giving the downhill inclination so that it may descend as it constitutes and goes astern in a tunnel mold Metal mold 1 can be reversed to a self-propelled mode by self-weight, establishing independently the migration means for promoting metal mold 1 in the go-astern direction is omitted, and it contributes to power reduction.

[0029] A cylinder 9 is for the metal mold 1 which downward path 2b was prepared caudad and arrived at the termination location of advance path (outward trip) 2a dropping reception and this to the Iriguchi height of go-astern path (return trip) 2c certainly. A cylinder 10 is to be prepared caudad, raise to reception the metal mold 1 of 2d of rise paths which arrived at the termination location of go-astern path 2c, and raise this even in the Iriguchi height of advance path 2a certainly. Moreover, a cylinder 11 is for forcing the back end side of this metal mold 1 in the condition that it was prepared in the entrance side of advance path 2a, and metal mold 1 went up to the starting point location of advance path 2a through 2d of rise paths, toward the advance direction. On the other hand, a cylinder 12 is for forcing the front end side of other metal mold 1 in front of the descent located in the head of the consecutiveness ranking after the metal mold 1 released from the sampling process at the terminal point of advance path 2a descends downward path 2b toward the direction where a cylinder 11 is reverse. That is, a cylinder 11 and a cylinder 12 are for pushing mutually all the metal mold 1 that can set advance path 2a inserted between two metal mold 1 located in said both ends in the adhesion direction from order. A cylinder 13 is for sending in the metal mold 1 which has descended downward path 2b toward the entry of go-astern path 2c.

[0030] As shown in drawing 3 and drawing 4, metal mold 1 consists of shuttering 1-1, a middle plate 1-2, and a rise-and-fall plate 1-3. Shuttering 1-1 consists of a configuration corresponding to Cast A, and in the case of the cast A of honeycomb structure which was taken up in the example etc., as shown in drawing 2, it is necessary for it to be for deciding the original form of a mold, for it to be located in the upper part part of metal mold 1, and to hold the uniformity of the thickness of a septum (barrel wall) by deciding the item location of many honeycomb forms correctly, respectively. A middle plate 1-2 is located in the middle of shuttering 1-1 and the rise-and-fall plate 1-3, blockades the whole surface of shuttering 1-1, and carries out the duty as decision of the original form of metal mold, and a guide of cast sampling actuation in cooperation with shuttering 1-1. The change in the clearance w between middle plates 1-2 (refer to drawing 4) is possible for the rise-and-fall plate 1-3 within limits to which it is located in under the middle plate 1-2, and descent is restricted by lower limit head 14a of the limit bolt 14. According to the strength of pantograph adherence pressure, it is stabilized and a coil spring 15 can hold the size of a clearance, when [ of the rise-and-fall plate 1-3 and a middle plate 1-2 ] doing, resisting the resiliency of a coil spring 15 and pushing up the rise-and-fall plate 1-3 up (the direction of Q arrow). By laying a head under the rise-and-fall plate 1-3, a knock out pin 16 is implanted upward towards a middle plate 1-2, and is prepared in a handstand condition. When the clearance w between the rise-and-fall plate 1-3 and a middle plate 1-2 fluctuates, it moves, and the tip projects the inside of two or more pin holes 17 prepared by penetrating a middle plate 1-2 on the top face of shuttering 1-1, or a knock out pin 16 retreats caudad. When the tip of a knock out pin 16 projects on the top face of shuttering 1-1, the cast A currently formed in the top face of shuttering 1-1 is sampled from the top face of shuttering 1-1. The increase and decrease of actuation of Clearance w are in the condition which regulated the height of shuttering 1-1 by outside guide-rail 8b and inside guide-rail 8c, and it can be carried out by making it go up and down with a means to describe the rise-and-fall plate 1-3 below.

[0031] The maintenance roller 18 is installed in the location where the inferior surface of tongue of the rise-and-fall plate 1-3 of metal mold 1 produces contact interference, when metal mold 1 reaches near the termination of a sampling process through advance path 2a and the passage location of metal mold 1 has



descended in C. The amount of tip protrusions of the knock out pin 16 which metal mold 1 contains increases, and the sampling activity of Cast A advances as descent of metal mold 1 advances further, after entering into contact interference. As an installation of the maintenance roller 18, use of the crowning of go-astern path 2c, supporting material, etc. is possible, for example.

[0032] The mode which manufactures the cast A of the honeycomb structure as an example of a cast continuously by the manufacturing installation concerning this example which consists of the above-mentioned configuration next is explained below. By operating the manufacturing installation of illustration, the matrix of an endless track type which consists of two or more metal mold 1 starts operation in alignment with a circulation stroke. Impregnation of the solid solution (for example, vinylchloride resin solution) is performed according to an individual from the upper limit disconnection section by the solid-solution injector 3 of the extrusion type prepared in the upstream of advance path 2a to the metal mold 1 which passes through the installation point of this equipment 3. Then, with the pressurizer 4 of the solid-solution injector 3 immediately prepared in the downstream, it pressurizes from a crowning equally to the solid solution (synthetic-resin solution) before coagulation starts through press roller 4a. Every one of the tubed honeycomb cast sections of a large number formed in the opening established in metal mold 1 extent of the pressurization in this case by the crowning A1 formed in a top face as band-like being monotonous Can combine all honeycomb casts in one and the handling as a continuation molding object (gestalt which connected [ sense / vertical reverse ] by carrying out the cast of drawing 2 ) is possible. And it considers as the pressure which is extent which can do the connecting plate A1 with thickness thin if possible (crowning), and the thickness of the crowning A1 as a connecting plate can be adjusted to arbitration by the handle which a pressurizer 4 offers.

[0033] As opposed to the metal mold 1 from the 1st piece of the beginning which aligned through during this period at advance path 2a to the 5th piece By carrying out the load of the pressing force of the direction mutually stuck between each metal mold 1 to said five metal mold 1 using the gearings 6a and 6b which mesh with rack 1a offered on the inferior surface of tongue of metal mold 1 with the boosters 5a and 5b of a pair Exsorption of the synthetic-resin solution from the contact surface between each metal mold 1 by the pressure at the time of extrusion impregnation is prevented.

[0034] While coagulation next starts by cooling a synthetic-resin solution, the sampling process of the metal mold 1 from Cast A is performed.

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**TECHNICAL FIELD**

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[Field of the Invention] This invention relates to the approach of manufacturing continuously many casts with which the pars basilaris ossis occipitalis was wide opened through the cast top plating as a continuation molding object connected forward and backward, and its manufacturing installation.

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**PRIOR ART**

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[Description of the Prior Art] For example, the injection molding approach well-known as a method and injection molding equipment which are performed from the former are common as the method of manufacturing the cast of the honeycomb structure which opened upper limit wide, or equipment. Since actuation is carried out by the basis of an easy and positive procedure so that it may be known well, this kind of the manufacture approach or a manufacturing installation has the advantage that a reliable cast is obtained, can employ that advantage efficiently depending on an application, and is used as the high approach and equipment of an availability.

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[Translation done.]

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## EFFECT OF THE INVENTION

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[Effect of the Invention] There is the following outstanding effectiveness in the continuation manufacture approach and this manufacturing installation of a cast concerning this invention so that clearly from the above explanation.

[0053] (1) By the manufacture approach of claim 1, since it both becomes applicable [ the continuous flow system by application of the knockout method of the solid solution, and circulation of two or more metal mold ], consequently mass-production-method organization can be realized, compared with the case where it manufactures by the conventional manufacture approach (mainly the injection molding approach), promotion of manufacture speed and reduction of product cost are realized.

[0054] (2) Since the manufacture approach concerning claim 1 can be enforced certainly and also it can fabricate in the manufacturing installation of claim 2 continuously by carrying out easy [ of two or more metal mold of a fixed form ], and circulating them, while the manufacturing cost of metal mold becomes comparatively cheap, Since the cast which two or more knock out pins were made to project in the cavity of metal mold corresponding to the reverse sense to drop metal mold gradually, and carried out cooling solidification with the guide means is sampled, mold omission is performed certainly.

[0055] (3) In invention of claim 3, the posture of the time of the coagulation of a cast starting in the middle of a production process and the metal mold when being in the process which samples metal mold from a cast can always be held into a horizontal posture. Consequently, that the non-set of the configuration of a cast is lost and the so-called good-looking cast is obtained, and when going caudad and sampling metal mold from a cast, since the direction of the friction surface on which it slides agrees with the direction of a vertical, sampling actuation is performed very easily.

[0056] (4) invention of claim 4 -- molding -- fear, such as the contact surface between metal mold before and after adjoining with transfer pressure then estranging, and a clearance being generated in the meantime, or the solid solution leaking outside from the clearance, and coming out, although impregnation of the solid solution is performed in a certain specific section in process, -- certain -- it can prevent -- impregnation actuation of the solid solution -- insurance -- it becomes possible to carry out certainly.

[0057] (5) Force between the front end side and back end side mutually from order in the adhesion direction in invention of claim 5 to all the metal mold of the molding process in the location of the upper part in the circulation path of metal mold, It becomes possible to continue operation of equipment safely, without barring the smooth nature of circulation migration of metal mold to each actuation of entry of the metal mold in balking of the metal mold at the time of the descent performed in the middle of a circulation process, or a rise process etc.

[0058] (6) Since it becomes claim 6 from the structure where the structure of metal mold is easy, a rise-and-fall plate is together put possible [ attachment and detachment ] within the limits of predetermined to a middle plate, and a knock out pin appears frequently in a cavity, by invention, handling is easy for it and the draw of a cast is also easily performed to it.

[0059] (7) In invention according to claim 7, since shuttering and a middle plate descend to coincidence along with a guide rail while being sent to the front in addition to the operation by equipment according to claim 3, a rise-and-fall plate being horizontally maintained by the cooperativity of a maintenance roller and a rail, two or more knock out pins implanted in the rise-and-fall plate project gradually in the cavity, and a cast is extracted from the shuttering of metal mold.

[0060] (8) In invention according to claim 8, after dropping the metal mold conveyed to the terminal point

location of an advance path at elevator guard and conveying it to termination on a band conveyor in accordance with a level guide orbit, metal mold can be certainly returned to the starting point location of an advance path by the elevator style.

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**TECHNICAL PROBLEM**

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[Problem(s) to be Solved by the Invention] Although the aforementioned conventional manufacture approach and a manufacturing installation can fully employ the advantage efficiently by the application. For example, if it puts in another way when manufacturing very a lot of casts very much moreover comparatively cheaply for a short time has the demand to a cast. When priority is given to a volume, time for delivery, or a cost cut over the demand about precision, such as a geometry of a cast, by the aforementioned conventional manufacture approach or the manufacturing installation, correspondence is difficult absolutely and the so-called examination of mass-production method installation is needed from it.

[0004] When an example is given, there is grass personal protective equipment of the grass parking lot by which the arrival eye is carried out the other day as an application of the cast A of the honeycomb structure shown in drawing 2. As the grass personal protective equipment which consists of a cast A of honeycomb structure is covered with and put on the whole surface and a car is parked on it, directly, it is made for the tire of a vehicle not to force grass, it has it, and this grass personal protective equipment aims at protection and its training of the grass in a parking lot, when parking a car at a grass parking lot. In the case of the cast of the honeycomb structure used for such an application, it is certain that priority is given to cast supply of an amount first huger than the demand about the improvement in precision of the geometry to a cast etc., and promotion of manufacture speed, and the demand to a cast is difficult to correspond by the conventional injection molding method to such a demand. That is, in order to rearrange the manufacture approach of the cast of honeycomb structure, or a manufacturing installation to the method which can respond to the above demands, it is necessary to throw away the conventional injection molding method, for example, to adopt the continuous manufacture method by the extrusion method.

[0005] It aims at offering the continuation manufacture approach and the equipment of the cast which can realize mass-production-method organization of automatic system by this invention having been made in view of the above-mentioned fault point, improving the trouble on the mass-production-method organization establishment resulting from equipment being an injection-molding method conventionally, adopting the circuit system by application of the knockout method of the solid solution, and two or more metal mold, and enabling implementation of a continuation manufacture method.

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## MEANS

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[Means for Solving the Problem] The manufacture approach of this invention concerning claim 1 for solution of the above-mentioned technical problem By pouring in the solid solution one by one and making it solidify to two or more metal mold remitted to the endless track type through which it circulates in the state of a matrix It is the approach of manufacturing many casts with which the bottom edge was wide opened through the cast top plating continuously as a continuation molding object connected forward and backward. \*\* The extrusion impregnation process of pouring in the solid solution to this metal mold during migration toward the terminal point of this migration from the starting point of the outward trip in which said two or more metal mold carries out advance migration, As the poured-in this solid solution solidifies as a cast, it goes from an adhesion condition with this cast caudad one by one to each metal mold. \*\* By [ slight ] making it break away a dimension every The sampling process which samples said continuation molding object from said metal mold, and the downward process which descends the metal mold released from the sampling process at the terminal point of the \*\* aforementioned outward trip directly under a terminal point location, \*\* The return process which goes metal mold astern along with the return trip which it was made to incline downward [ a condition or downward ] near a \*\*\*\* horizontal, and was prepared from the location which descended, and which carries out go-astern migration, and returns to the directly under location of the starting point of said outward trip, \*\* It is characterized by consisting of a rise process which goes up said metal mold from this directly under location to the starting point location of said outward trip right above.

[0007] According to the manufacture approach concerning this invention which has the above-mentioned configuration, with the gestalt of the continuation molding object connected forward and backward through the top plating cast by coincidence in many casts with which the end (whole surface) was opened wide, many casts can be continuously manufactured from an extrusion type injector by carrying out sequential impregnation of the solid solution at metal mold, consequently mass-production-method organization can be realized. Thereby, the manufacturing cost of a cast can be lowered sharply.

[0008] The manufacturing installation of this invention concerning claim 2 for solution of the above-mentioned technical problem By pouring in the solid solution one by one and making it solidify to two or more metal mold remitted to the endless track type through which it circulates in the state of a matrix A conveyance means of metal mold to be equipment which manufactures continuously many casts with which the bottom edge was wide opened through the cast top plating as a continuation molding object connected forward and backward, to make a single string continue mutually in the state of adhesion, and to convey said metal mold of a plurality horizontally, b) The extrusion injector which is arranged above the metal mold conveyance starting position of the conveyance means of this metal mold, and pours in the solid solution to this metal mold that carries out advance migration, c) The pressurizer which adjoins this extrusion injector, is arranged to a metal mold conveyance-side, presses the top face of the solid solution poured in into metal mold by the predetermined pressure, and is continuously fabricated to a flat field, d) A guide means to guide metal mold below gradually using the conveyance force of metal mold, It has a draw means to make two or more knock out pins which can appear freely frequently in a cavity project from an inferior surface of tongue upward to migration in the lower part of this metal mold corresponding to the reverse sense, and a circulation means of metal mold to circulate the metal mold e Sampled to the conveyance starting position of said metal mold.

[0009] Since the manufacture approach concerning claim 1 can be enforced certainly according to the

manufacturing installation according to claim 2 concerning the above-mentioned configuration and also it can fabricate continuously by carrying out easy [ of two or more metal mold of a fixed form ], and circulating them Since the cast which two or more knock out pins were made to project in the cavity of metal mold corresponding to the reverse sense to drop metal mold gradually, and carried out cooling solidification with the guide means is sampled while the manufacturing cost of metal mold becomes comparatively cheap, mold omission is performed certainly.

[0010] It is desirable to equip with the guide idler guided for said guide means at said metal mold so that it may continue in the level condition according to an individual through between ahead movement by the condition of the medial axis which meets in the advance direction of metal mold when [ according to claim 3 ] said metal mold goes caudad one by one from an adhesion condition with a cast in accordance with [ like ] said guide means, a level condition is mostly maintained with addressing omission \*\*\*\*\* to few dimensions and it moves forward and may hold, enabling free rotation.

[0011] According to the manufacturing installation according to claim 3, by composition with migration of a \*\*\*\* horizontal direction, and migration of the direction of a vertical for sampling actuation, the locus of migration of metal mold while moving a sampling process becomes possible [ regulating this horizontally powerfully ] to the inclination which is easy to serve as a posture of slanting facing down according to an individual sometimes, and can hold the posture of metal mold into a horizontal posture. The evil by the posture of metal mold turning into a posture of slanting facing down When going caudad and sampling metal mold from that there is a possibility that coagulation may start with the condition which is not level, and the configuration of a cast may become badly made in the condition that the poured-in solid solution has not solidified completely, and a cast, It is the direction of the friction surface on which it slides mutually not agreeing with the direction of a vertical, therefore being unable to perform smooth sampling actuation easily etc. These problems can solve all very easily by continuing and holding the medial axis of the metal mold in a sampling process in the level condition according to an individual through between these migration. [0012] It is desirable to establish the means which carries out the load of the pressing force of the direction which continues at the specific section according to claim 4 with the molding process which carries out advance migration while impregnation of said solid solution is performed like, and is mutually stuck from order to two or more metal mold under migration.

[0013] According to the manufacturing installation according to claim 4, impregnation of the solid solution is performed in a certain specific section in a molding process, but Although there is a possibility that the contact surface between metal mold before and after adjoining with the transfer pressure at that time may estrange mutually, a clearance may be generated in the meantime, and the solid solution may leak and come out outside from the clearance By restricting the stroke section before and after performing impregnation of the solid solution by the configuration of this claim, and carrying out the load of the pressing force of the direction mutually stuck from order, the exsorption to the exterior from said clearance can be prevented, and it becomes possible to carry out impregnation actuation of the solid solution safely certainly. <BR> [0014] It is desirable to form the back end side of this metal mold in the condition according to claim 5 of said metal mold having circulated and having returned to said metal mold conveyance starting position like, and the pressing mechanism for forcing between the front end sides of other metal mold mutually in the adhesion direction from order in the terminal point location of said advance migration.

[0015] According to the manufacturing installation according to claim 5, to all the metal mold of the molding process in the upper part location in the circulation path of metal mold by forcing between the front end side and back end side mutually in the adhesion direction from order It becomes possible to continue operation of equipment to each actuation of balking of the metal mold in the downward process performed in the middle of a circulation process, or a return of the metal mold to a manufacture starting position, without barring the smooth nature of circulation migration of metal mold.

[0016] Like, said knock out pin can be implanted towards the shuttering [ which consists said metal mold of a cavity according to claim 6 corresponding to said cast ], and middle plate side which drilled two or more pin holes which two or more knock out pins penetrate possible [ frequent appearance in said cavity ] while blockading the whole surface of this shuttering, and this middle plate side, and it can constitute from a rise-and-fall plate which can attach and detach within the limits of predetermined to a middle plate. In addition, needless to say, the middle plate which blockades the whole surface of shuttering and this shuttering can be formed in one.



[0017] According to the manufacturing installation according to claim 6, the structure of metal mold is easy, since a rise-and-fall plate consists of structure where it is together put possible [ attachment and detachment ] within the limits of predetermined, and a knock out pin appears frequently in a cavity, to a middle plate, handling is easy and the draw of a cast is also performed easily. [0018]

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## DESCRIPTION OF DRAWINGS

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### [Brief Description of the Drawings]

[Drawing 1] It is the general drawing showing the outline of the continuation manufacturing installation of the cast concerning the 1st example of this invention.

[Drawing 2] It is the perspective view showing the cast of the honeycomb structure as an example of the cast manufactured by the manufacturing installation of \*\*\*\*1 .

[Drawing 3] Metal mold [ in / in drawing 3 (a) / the III-III line position in drawing 1 ], the sectional view of the circumference of it, and drawing 3 (b) are the sectional views cut by the I-I line of drawing 3 (a).

[Drawing 4] It is the sectional view of the metal mold in the IV-IV line position in drawing 1 , and the important section of the circumference of it.

[Drawing 5] It is the general drawing showing the outline of the continuation manufacturing installation of the cast concerning the 2nd example of this invention.

[Drawing 6] It is the perspective view showing the cast of the honeycomb structure as other examples of the cast manufactured by the manufacturing installation of drawing 5 .

[Drawing 7] Metal mold [ in / in drawing 7 (a) / the VII-VII line position in drawing 5 ], the sectional view of the circumference of it, and drawing 7 (b) are the sectional views cut by the II-II line of drawing 7 (a).

[Drawing 8] It is the sectional view of the metal mold in the VIII-VIII line position in drawing 5 , and the important section of the circumference of it.

### [Description of Notations]

- 1 and 1' Metal mold
- 1-1 Shuttering (Body of Metal Mold)
- 1-2 Middle Plate (Body of Metal Mold)
- 1-3 Rise-and-Fall Plate
- 1a Rack
- 1b Outside roller
- 1c Inside roller
- 2 Circulation Path
- 2a Advance path (outward trip)
- 2b Downward path
- 2c Go-astern path (return trip)
- 2d Rise path
- 3 Extrusion Object Injector
- 4 Pressurizer
- 4a Press roller
- 5a and 5b Booster
- 6a and 6b Gearing (pinion)
- 7a and 7b Motor
- 8b Outside guide rail
- 8c Inside guide rail
- 9, 10, 11, 12, 13 Cylinder (elevator style)
- 14 Limit Bolt
- 15 Coil Spring

16 Knock Out Pin  
17 Pin Hole  
18 and 18' Maintenance roller  
19 Rail  
21 Guide Orbit  
22 Band Conveyor  
23 Bearing Roller 23  
24-25 Inclination guide section  
A-A' Cast

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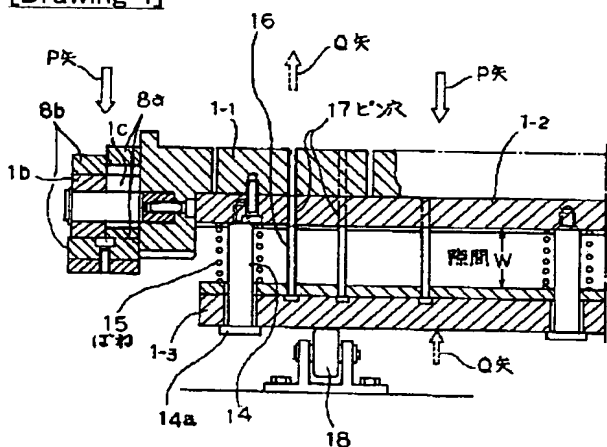
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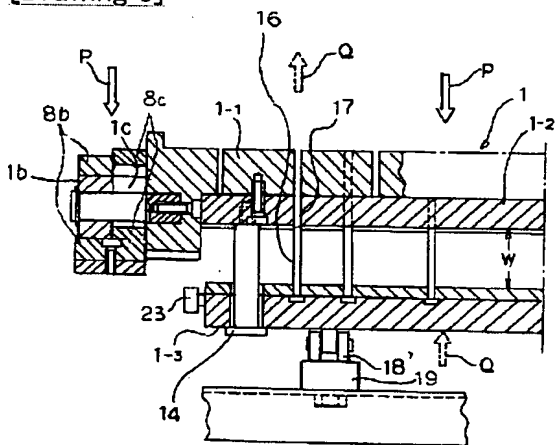
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DRAWINGS

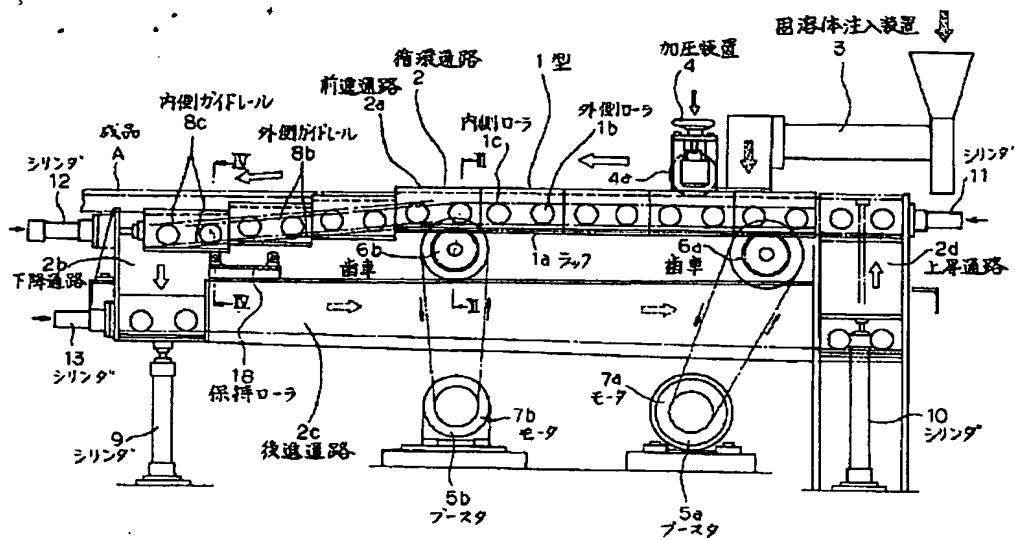
[Drawing 4]



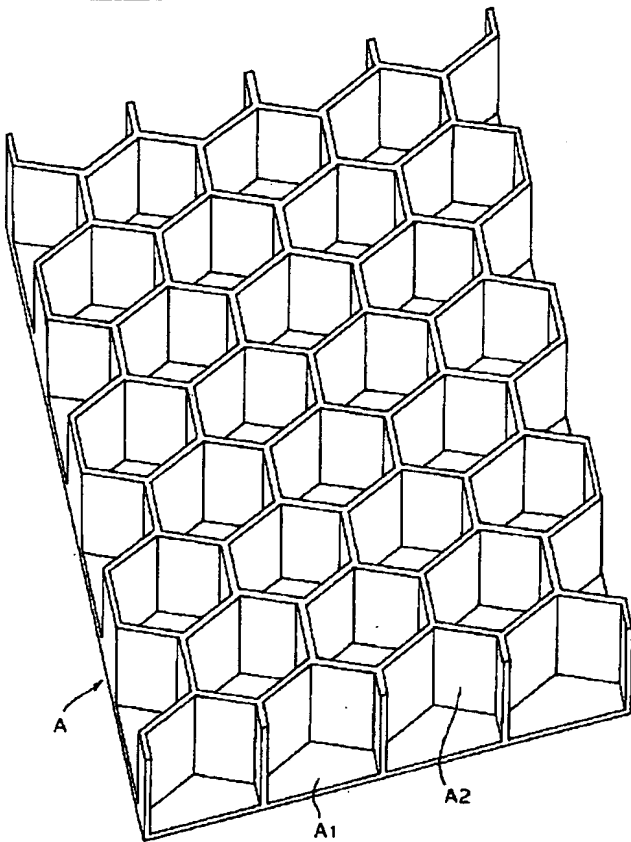
[Drawing 8]



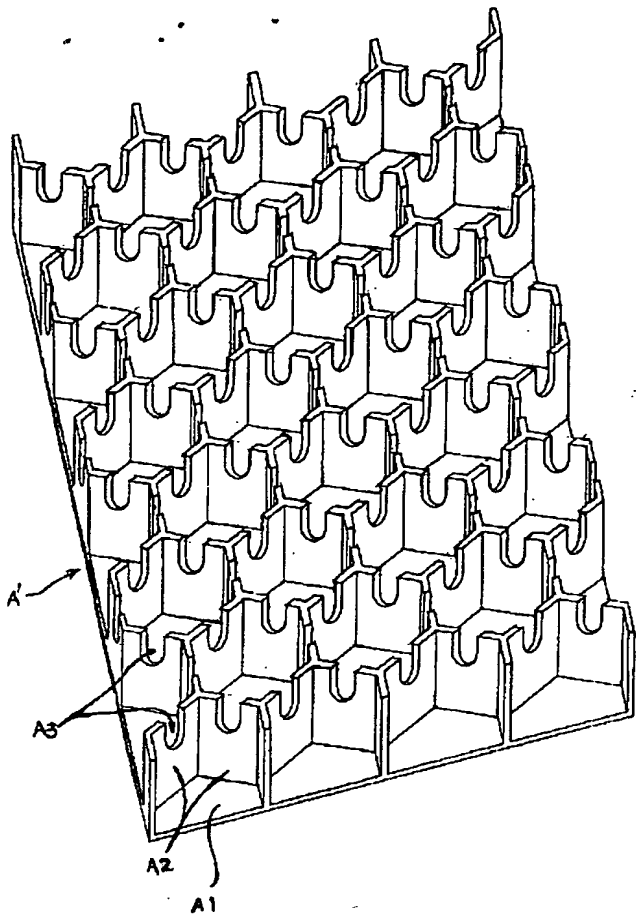
[Drawing 1]



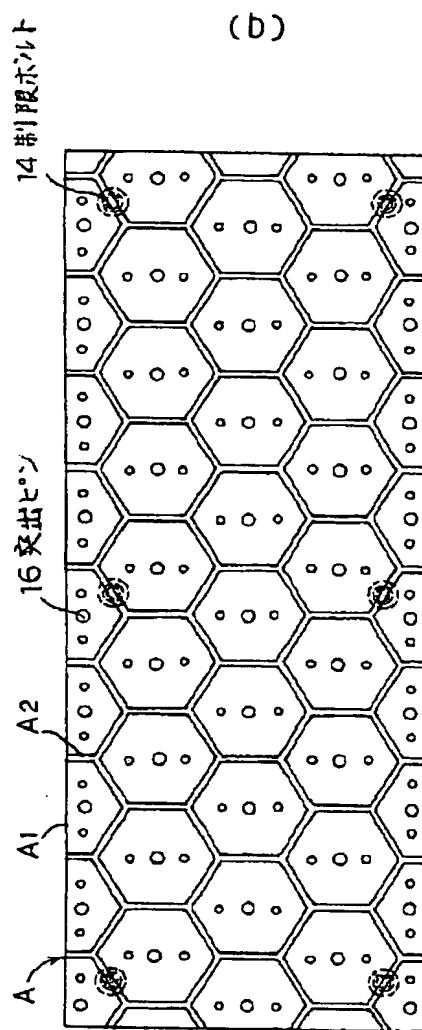
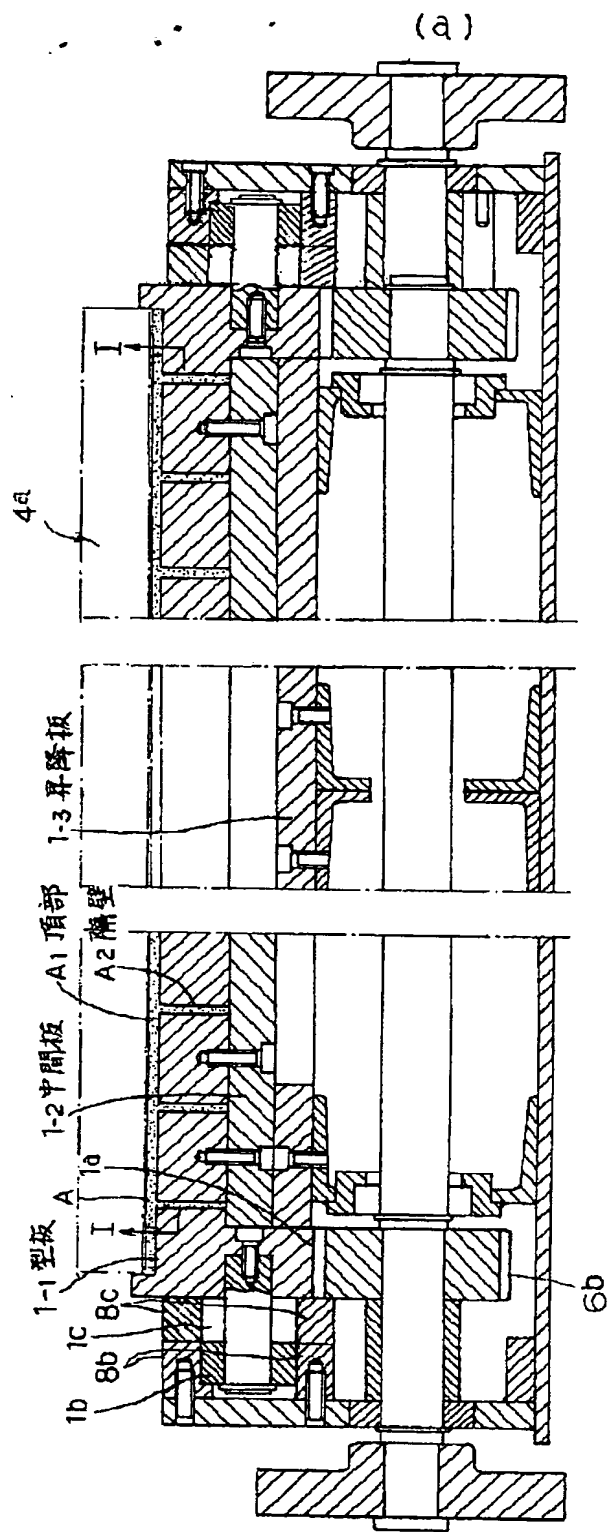
[Drawing 2]



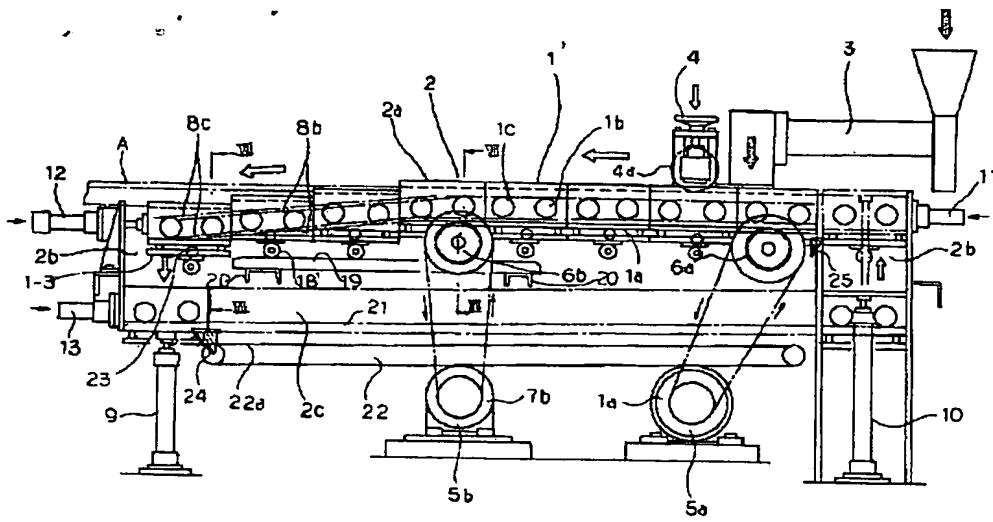
[Drawing 6]



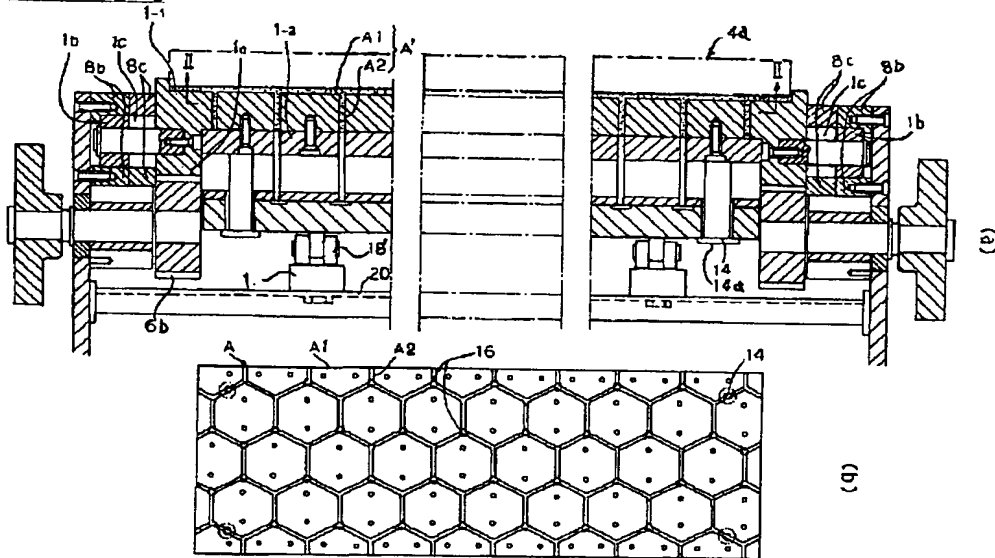
[Drawing 3]



[Drawing 5]



[Drawing 7]



[Translation done.]



(19) 日本国特許庁 (J P)

(12) 公開特許公報 (A)

(11) 特許出願公開番号

特開平11-221828

(43) 公開日 平成11年(1999) 8月17日

(51) Int.Cl.<sup>9</sup>

B 2 9 C 33/36

45/04

// B 2 9 L 31:60

識別記号

F I

B 2 9 C 33/36

45/04

審査請求 未請求 請求項の数 8 O L (全 12 頁)

(21) 出願番号 特願平10-235623

(22) 出願日 平成10年(1998) 8月21日

(31) 優先権主張番号 特願平9-331895

(32) 優先日 平 9 (1997) 12月 2 日

(33) 優先権主張国 日本 (J P)

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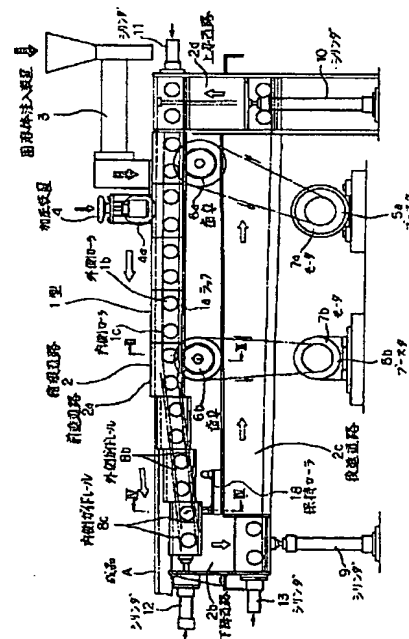
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(54) 【発明の名称】 成型品の連続製造方法とその製造装置

(57) 【要約】

【課題】 塩化ビニール合成樹脂溶液などの固溶体によって製造される連続模様の構造体を、従来の射出成型方式から押し出し方式に改善して、連続流れ方式による自動式の大量生産体制を実現できる成型品の製造装置を提供する。

【解決手段】 順次に循環して移動する複数個の金型 1 に対して塩化ビニール合成樹脂溶液を連続して注入し、凝固させた後、成型された板状の頂部 A 1 を介して成型品 A を前後に繋がる連続成型体として金型 1 から自動式に抜き取るものである。



## 【特許請求の範囲】

【請求項1】 循環する無限軌道式に行列の状態ですられてくる複数の金型に対して、固溶体を順次に注入して凝固させることにより、成型された頂板を介して底端が開放された多数の成型品を前後に繋がる連続成型体として連続して製造する方法であって、前記複数の金型が前進移動する往路の始点から該移動の終点に向かって移動中に該金型への固溶体の注入を行う押出注入工程と、該注入された固溶体が成型品として凝固する途中に、それぞれの金型に対し該成型品との密着状態から順次に下方に向かって僅かの寸法ずつ離脱させることにより、前記連続成型体を前記金型から抜き取る抜取工程と、前記往路の終点で抜取工程から解放された金型を終点位置の直下に下降する下降工程と、下降した位置からほぼ水平に近い状態又は下向きに傾斜させて設けられた後進移動する復路に沿って金型を後進し、前記往路の始点の直下位置まで復帰する復帰工程と、該直下位置から直上の前記往路の始点位置まで前記金型を上昇する上昇工程とからなることを特徴とする成型品の連続製造方法。

【請求項2】 循環する無限軌道式に行列の状態ですられてくる複数の金型に対して、固溶体を順次に注入して凝固させることにより、成型される頂板を介して底端が開放された多数の成型品を前後に繋がる連続成型体として連続的に製造する装置であって、複数の前記金型を相互に密着状態で一連に連続させて水平に搬送する金型の搬送手段と、該金型の搬送手段の金型搬送開始位置の上方に配設され、前進移動する該金型への固溶体の注入を行う押出注入装置と、該押出注入装置に隣接して金型の搬送側へ配設され、金型内に注入された固溶体の上面を所定圧力で押圧し、連続的に平坦な面に成形する加圧装置と、金型の搬送力を利用して金型を漸次下方へガイドするガイド手段と、該金型の下方への移動に逆向きに対応して下面からキャビティ内に出没自在な複数の突出ピンを上向きに突出させる型抜手段と、抜き取られた金型を、前記金型の搬送開始位置へ循環させる金型の循環手段とを備えたことを特徴とする成型品の連続製造装置。

【請求項3】 前記ガイド手段に沿って前記金型が成型品との密着状態から順次に下方に向かって僅かの寸法宛抜き取られながらほぼ水平状態を保って前進するとき、金型の前進方向に沿う中心軸の状態を前進の間を通じて個別に水平状態に継続して保持するように、前記金型に前記ガイド手段に案内されるローラが回転自在に装着されている請求項2記載の成型品の連続製造装置。

【請求項4】 前記固溶体の注入が行われながら前進移

動する成型工程のある特定の区間に互り移動中の複数個の金型に対して前後から相互に密着させる方向の押付力を負荷する手段が設けられている請求項2又は3記載の成型品の連続製造装置。

【請求項5】 前記金型が循環されて前記金型搬送開始位置まで復帰した状態の該金型の後端面と、前記前進移動の終点位置において他の金型の前端面との間を、前後から相互に密着方向に押し付けるための押付手段が設けられている請求項2又は3記載の成型品の連続製造装置。

【請求項6】 前記金型を、前記成型品に対応するキャビティからなる型枠と、この型枠の一面を閉塞するとともに、複数の突出ピンが前記キャビティ内に出没可能に貫通する複数のピン穴を穿設した中間板と、この中間板側に向けて前記突出ピンを植設し、中間板に対し所定の範囲内で接離可能な昇降板とから構成した請求項2記載の成型品の連続製造装置。

【請求項7】 前記金型の両側面の前後に内側ローラと外側ローラとをそれぞれ回転自在に装着し、金型が水平に維持されかつ前方へ向け漸次下方へ移動するように、前記内側ローラを案内する内側ガイドレールと前記外側ローラを案内する外側ガイドレールとをそれぞれ配設するとともに、前記金型の前記昇降板を移動可能にかつ水平に維持するためのレールおよび保持ローラ的一方を、昇降板の下面あるいは前記内外のガイドレールに沿ってその下方に、他方を前記内外のガイドレールに沿ってその下方あるいは前記昇降板の下面に設けた請求項3又は6記載の成型品の連続製造装置。

【請求項8】 前記前進通路の終点位置で内外ガイドレールの終端位置に垂直方向に昇降し、前記金型を支持して下降する昇降機構を配備するとともに、この昇降機構の下降位置を始点として前記金型の内外のローラを載置可能かつ走行可能なガイド軌道を水平に前記前進通路に平行に後方へ向けて配設し、該ガイド軌道に沿って前記金型の搬送用ベルトコンベヤを併設し、前記ガイド軌道の終端から前記金型を支持して前記前進通路の始点位置へ上昇する昇降機構を配備した請求項3又は7記載の成型品の連続製造装置。

## 【発明の詳細な説明】

## 【0001】

【発明の属する技術分野】この発明は、成型された頂板を介して底部が開放された多数の成型品を前後に繋がる連続成型体として連続的に製造する方法とその製造装置に関するものである。

## 【0002】

【従来の技術】たとえば、上端を開放したハニカム構造の成型品を製造する方法あるいは装置として、従来から行われる方式としては、公知の射出成型方法および射出成型装置が一般的である。この種の製造方法あるいは製

造装置は、よく知られるように、操作が簡単で確実な手順のもとに実施されるため、信頼性の高い成型品が得られるという利点があり、用途によってはその利点を生かすことができ、利用度の高い方法および装置として用いられている。

【0003】

【発明が解決しようとする課題】前記の従来の製造方法および製造装置は、用途によって十分にその利点を生かすことのできるものではあるが、たとえば成型品に対する要求が、きわめて大量の成型品を比較的安価に、しかもごく短時間に製造することにある場合、言い換えると、成型品の形状寸法などの精度に関する要求よりも、生産量、納期あるいはコストダウンなどが優先されるような場合、前記の従来の製造方法あるいは製造装置では、到底対応が困難であり、いわゆる大量生産方式導入の検討が必要となる。

【0004】一例を挙げると、図2に示すハニカム構造の成型品Aの用途として先般来着目されている芝生駐車場の芝生保護具がある。この芝生保護具は、芝生駐車場に駐車する場合に、ハニカム構造の成型品Aよりなる芝生保護具を一面に敷き詰めて置き、その上に駐車するようにして、車のタイヤが直接に芝生を押し付けないようにし、もって駐車場内の芝生の保護とその育成を図るようにしたものである。このような用途に使用されるハニカム構造の成型品の場合、成型品に対する要求は、まず成型品に対する形状寸法などの精度向上に関する要求よりも、膨大な量の成型品調達と製造スピードの促進が優先されることは間違いなく、このような要求に対して従来の射出成型方式で対応することは困難である。すなわち、ハニカム構造の成型品の製造方法あるいは製造装置を前記のような要求に対応し得る方式に組み替えるためには、従来の射出成型方式を捨てて、たとえば押出方式による連続的な製造方式を採用する必要がある。

【0005】この発明は、上述の不具合点を鑑みてなされたもので、従来装置が射出成型方式であることに起因する大量生産体制樹立上の問題点を改良し、固溶体の押し出し方式の適用と複数の金型による循環方式を採用して連続製造方式の実現を可能とすることにより、自動式の大量生産体制を実現できる成型品の連続製造方法とその装置を提供することを目的としている。

【0006】

【課題を解決するための手段】上記の課題を解決のための請求項1に係る本発明の製造方法は、循環する無限軌道式に行列の状態で送られてくる複数の金型に対して、固溶体を順次に注入して凝固させることにより、成型された頂板を介して底端が開放された多数の成型品を前後に繋がる連続成型体として連続して製造する方法であって、

① 前記複数の金型が前進移動する往路の始点から該移動の終点に向かって移動中に該金型への固溶体の注入を

行う押出注入工程と、

② 該注入された固溶体が成型品として凝固する途中に、それぞれの金型に対し該成型品との密着状態から順次に下方に向かって僅かの寸法ずつ離脱させることにより、前記連続成型体を前記金型から抜き取る抜取工程と、

③ 前記往路の終点で抜取工程から解放された金型を終点位置の直下に下降する下降工程と、

④ 下降した位置からほぼ水平に近い状態又は下向きに傾斜させて設けられた後進移動する復路に沿って金型を後進し、前記往路の始点の直下位置まで復帰する復帰工程と、

⑤ 該直下位置から直上の前記往路の始点位置まで前記金型を上昇する上昇工程とからなることを特徴とするものである。

【0007】上記の構成を有する本発明に係る製造方法によれば、一端（一面）が開放された多数の成型品を同時に成型される頂板を介して前後に繋がる連続成型体の形態で、押出式注入装置から固溶体を金型に順次注入することにより連続して多数の成型品を製造することができ、その結果、大量生産体制を実現することができる。これにより、成型品の製造コストを大幅に下げられる。

【0008】上記の課題を解決のための請求項2に係る本発明の製造装置は、循環する無限軌道式に行列の状態で送られてくる複数の金型に対して、固溶体を順次に注入して凝固させることにより、成型された頂板を介して底端が開放された多数の成型品を前後に繋がる連続成型体として連続的に製造する装置であって、

a) 複数の前記金型を相互に密着状態で一連に連続させて水平に搬送する金型の搬送手段と、b) 該金型の搬送手段の金型搬送開始位置の上方に配設され、前進移動する該金型への固溶体の注入を行う押出注入装置と、c) 該押出注入装置に隣接して金型の搬送側へ配設され、金型内に注入された固溶体の上面を所定圧力で押し、連続的に平坦な面に成形する加圧装置と、d) 金型の搬送力を利用して金型を漸次下方へガイドするガイド手段と、該金型の下方への移動に逆向きに対応して下面からキャビティ内に出没自在な複数の突出ピンを上向きに突出させる型抜手段と、e) 抜き取られた金型を、前記金型の搬送開始位置へ循環させる金型の循環手段とを備えている。

【0009】上記の構成に係る請求項2記載の製造装置によれば、請求項1に係る製造方法を確実に実施できるほか、定形の金型を複数個容易し、それらを循環させることにより連続して成形できるので、金型の製作費が比較的安価になるとともに、ガイド手段によって金型を漸次下降させるのに逆向きに対応して複数の突出ピンを金型のキャビティ内に突出させて冷却固化した成型品を抜き取るので、確実に型抜きが行われる。

【0010】請求項3に記載のように、前記ガイド手段に沿って前記金型が成型品との密着状態から順次に下方

に向かって僅かの寸法宛抜き取られながらほぼ水平状態を保って前進するとき、金型の前進方向に沿う中心軸の状態を前進の間を通じて個別に水平状態に継続して保持するように、前記金型に前記ガイド手段に案内されるガイドローラを回転自在に装着するのが好ましい。

【0011】請求項3記載の製造装置によると、抜取工程を移動中の金型の移動の軌跡が、ほぼ水平方向の移動と抜取操作のための鉛直方向の移動との合成によって、とすれば個別に斜め下向きの姿勢となり易い傾向に対して、強力にこれを水平方向に規制することが可能となり、金型の姿勢を常に水平方向の姿勢に保持することができる。金型の姿勢が斜め下向きの姿勢になることによる弊害は、注入した固溶体が完全に凝固していない状態のとき、成型品の頂面が水平でない状態のままで凝固が始まって成型品の形状が出来なくなるおそれがあること、ならびに成型品から金型を下方に向かって抜き取る時、互いに滑動する摩擦面の方向が鉛直方向と合致せず、そのため円滑な抜取操作が出来にくいこと、などである。抜取工程中の金型の中心軸を、該移動の間を通じて個別に水平状態に継続して保持することにより、これらの問題はいずれもきわめて容易に解決することができる。

【0012】請求項4に記載のように、前記固溶体の注入が行われながら前進移動する成型工程のある特定の区間に互い移動中の複数個の金型に対して前後から相互に密着させる方向の押付力を負荷する手段を設けることが望ましい。

【0013】請求項4記載の製造装置によると、成型工程のある特定の区間において固溶体の注入が行われるが、そのときの注入圧力によって隣接する前後の金型間の接触面が相互に離間してその間に隙間が生じ、固溶体はその隙間から外部に漏れ出るおそれがあるが、本請求項の構成によって、固溶体の注入が行われる前後の行程区間を限り、前後から相互に密着させる方向の押付力を負荷することにより、前記隙間からの外部への漏出が防止できて、固溶体の注入操作を安全確実に実施することが可能となる。

【0014】請求項5記載のように、前記金型が循環されて前記金型搬送開始位置まで復帰した状態の該金型の後端面と、前記前進移動の終点位置において他の金型の前端面との間を前後から相互に密着方向に押し付けるための押付手段を設けることが好ましい。

【0015】請求項5記載の製造装置によると、金型の循環通路中の上方位置にある成型工程のすべての金型に対し、その前端面と後端面との間を前後から相互に密着方向に押し付けることにより、循環工程の途中において行われる下降工程における金型の離脱、あるいは製造開始位置への金型の復帰等の各作動に対し、金型の循環移動の円滑性を妨げることなく装置の運転を続行することが可能となる。

【0016】請求項6記載のように、前記金型を、前記成型品に対応するキャビティからなる型枠と、この型枠の一面を閉塞するとともに、複数の突出ピンが前記キャビティ内に出没可能に貫通する複数のピン穴を穿設した中間板と、この中間板側に向けて前記突出ピンを植設し、中間板に対し所定の範囲内で接離可能な昇降板とから構成することができる。なお、言うまでもなく、型枠とこの型枠の一面を閉塞する中間板とを一体に形成することができる。

【0017】請求項6に記載の製造装置によれば、金型の構造が簡単で、中間板に対し昇降板が所定の範囲内で接離可能に組み合わされ、キャビティ内に突出ピンが出没する構造からなるから、取り扱いが容易で、成型品の抜き出しも容易に行われる。

【0018】請求項7に記載のように、前記金型の両側面の前後に内側ローラと外側ローラとをそれぞれ回転自在に装着し、金型が水平に維持されかつ前方へ向け漸次下方へ移動するように、前記内側ローラを案内する内側ガイドレールと前記外側ローラを案内する外側ガイドレールとをそれぞれ配設するとともに、前記金型の前記昇降板を移動可能にかつ水平に維持するためのレールおよび保持ローラ的一方を、昇降板の下面あるいは前記内外のガイドレールに沿ってその下方に、他方を前記内外のガイドレールに沿ってその下方あるいは前記昇降板の下面に設けることができる。

【0019】請求項7記載の製造装置によれば、請求項3記載の装置による作用に加えて、昇降板が保持ローラとレールとの協同作用によって水平に維持されつつ前方へ送られる間に、型枠と中間板とが同時にガイドレールに沿って下降してくるので、昇降板に植設された複数の突出ピンがキャビティ内に徐々に突出していき、成型品が金型の型枠から抜き出される。

【0020】請求項8に記載のように、前記前進通路の終点位置で内外ガイドレールの終端位置に垂直方向に昇降し、前記金型を支持して下降する昇降機構を配備するとともに、この昇降機構の下降位置を始点として前記金型の内外のローラを載置可能かつ走行可能なガイド軌道を水平に前記前進通路に平行に後方へ向けて配設し、該ガイド軌道に沿って前記金型の搬送用ベルトコンベヤを併設し、前記ガイド軌道の終端から前記金型を支持して前記前進通路の始点位置へ上昇する昇降機構を配備することができる。

【0021】請求項8記載の製造装置によれば、前進通路の終点位置まで搬送された金型を昇降機構で下降させ、水平なガイド軌道に沿ってベルトコンベヤによって終端まで搬送したのち、昇降機構によって金型を前進通路の始点位置まで確実に戻すことができる。

【0022】

【発明の実施の形態】以下、本発明に係る成型品の連続製造方法と同製造装置についての実施の形態を図面に基

づいて以下に詳しく説明する。

【0023】図1は本発明に係る成型品の連続製造装置の概要を示す全体図、図2は図1の製造装置によって製造される成型品の一例としてのハニカム構造の成型品を示す斜視図、図3(a)は図1中のIII-III線位置における金型とその周辺の断面図、図3(b)は図3(a)のI-I線で切断した断面図であり、図4は図1中のIV-IV線位置における金型とその周辺の要部の断面図である。

【0024】図1において、金型1は本例では、図2に示す上端開放の六角形状の筒体が連続するハニカム構造の成型品Aに対応する形状のもので、所定幅(たとえば1000mm)で所定長さ(たとえば200mm)からなる。その複数個の金型1が開放された面を上向きにして循環する無限軌道式の行列の状態に配列され、循環通路2の途中に設けられる種々の型移動手段により、循環通路2に沿って循環移動させられる。金型1は底面両側にラック1aが設けられ、前部の左右位置に一对の外側ローラ1b、1b、ならびに後部の左右位置に一对の内側ローラ1c、1cが設けられる。外側ローラ1bと内側ローラ1cとは同一高さで側方への突出量に差(内側位置と外側位置)が設けられている。この構成により、抜取工程において、後述の内外ガイドレール8a・8bと内外ローラ1b・1cとによって金型1の姿勢を常に水平方向の姿勢に保持しながら、金型1を漸次下降させることができる。

【0025】循環通路2は、往路としての前進通路2a、下降通路2b、復路としての後進通路2cおよび上昇通路2dよりなる。押出式の固溶体注入装置3は前進通路2a内の上流位置に設けられ、通過する金型1に対し、その上部から成型品Aの原料として流動性のある固溶体(たとえば、塩化ビニル樹脂溶液)を押出注入するためのものである。加圧装置4は、固溶体注入装置3のすぐ下流側(前方)に設けられ、凝固が始まる前の固溶体に対して頂部から均等に圧力を加えるためのもので、回転可能な押圧ローラ4aをそなえる。

【0026】5aおよび5b是一对のブースタで、本例では金型1の5個分に相当する前後間隔を隔てた位置に設けられ、それぞれ金型1のそなえるラック1aとかみ合う歯車6aおよび6bをそなえている。歯車6aは比較的トルクの大きい(あるいは回転速度の速い)モータ7aによって駆動され、歯車6bは比較的トルクの小さい(あるいは回転速度の遅い)モータ7bによって駆動される。モータ7aとモータ7bとの出力差(あるいは搬送速度差)によって、それぞれの駆動する金型1の間に相互に密着させる方向の押付力を負荷することができる。

【0027】前進通路2aの左右両側面に、外側ガイドレール8bならびに内側ガイドレール8cがそれぞれ設けられる。外側ガイドレール8bは金型1のそなえる外側ローラ1bの高さ位置を規制し保持するためのもので

あり、内側ガイドレール8cは金型1のそなえる内側ローラ1cの高さ位置を規制し保持するためのものである。このように金型1のそれぞれのローラ1b・1cの高さ位置を保持することにより、金型1が抜取工程を通過中に金型1の移動方向に沿う中心軸の状態を該移動の間を通じて個別に水平状態に継続して保持することができる。

【0028】後進通路2cは、下降通路2bを通過して下降した位置から金型1を後進させるための通路(復路)で、後進通路2cをトランク型に構成し、もしくはトンネル型に構成して、後進するにしたがって下降するように下り坂の傾斜を持たせておくことにより、金型1を自重にて自走式に後進させることができ、金型1を後進方向に推し進めるための移動手段を別に設けるのが省略されて動力節減に寄与する。

【0029】シリンダ9は、下降通路2bの下方に設けられて、前進通路(往路)2aの終端位置に達した金型1を確実に受け取り、これを後進通路(復路)2cの入口高さまで下降させるためのものである。シリンダ10は、上昇通路2dの下方に設けられて、後進通路2cの終端位置に達した金型1を確実に受け取り、これを前進通路2aの入口高さまで上昇させるためのものである。またシリンダ11は、前進通路2aの入口側に設けられ、金型1が上昇通路2dを経て前進通路2aの始端位置まで上昇した状態の該金型1の後端面を前進方向に向かって押し付けるためのものである。一方、シリンダ12は、前進通路2aの終端において抜取工程から解放された金型1が下降通路2bを下降したあとの後続順位の先頭に位置する下降直前の他の金型1の前端面を、シリンダ11とは逆の方向に向かって押し付けるためのものである。すなわちシリンダ11とシリンダ12とは、前記両端に位置する2個の金型1の間に挟まれる前進通路2aにおけるすべての金型1を、前後から相互に密着方向に押し付けるためのものである。シリンダ13は、下降通路2bを下降してきた金型1を後進通路2cの入り口に向かって送り込むためのものである。

【0030】図3・図4に示すように、金型1は、型枠1-1と、中間板1-2と、昇降板1-3とよりなる。型枠1-1は、成型品Aに対応する形状からなり、型の原形を確定するためのもので、金型1の上方部分に位置し、実施例に取り上げたようなハニカム構造の成型品Aなどの場合には、図2に示すように、多数のハニカム形の単品位置をそれぞれ正確に確定することによって、隔壁(筒壁)の厚さの均等性を保持する必要がある。中間板1-2は、型枠1-1と昇降板1-3との間に位置し、型枠1-1の一面を閉塞するもので、型枠1-1と協同して金型の原形の確定ならびに成型品抜取操作のガイドとしての役目をする。昇降板1-3は中間板1-2の下方に位置し、制限ボルト14の下端頭部14aによって下降が制限される範囲内で中間板1-2との間の隙

間w(図4参照)の増減が可能である。コイルバネ15は、昇降板1-3と中間板1-2との間にあって、コイルバネ15の弾発力に抗して昇降板1-3を上方(Q矢の方向)に押し上げるとき、押上力の強さに応じて隙間の広さを安定して保持することが可能である。突出ピン16は頭部を昇降板1-3に埋設することにより中間板1-2に向け上向きに植設され、倒立状態に設けられる。昇降板1-3と中間板1-2との間の隙間wが増減するとき、突出ピン16は中間板1-2を貫通して設けられた複数のピン穴17内を進退して、その先端が型枠1-1の上面に突出し、あるいは下方に後退する。突出ピン16の先端が型枠1-1の上面に突出するとき、型枠1-1の上面に形成されている成型品Aは型枠1-1の上面から抜き取られる。隙間wの増減作動は、型枠1-1の高さを外側ガイドレール8bならびに内側ガイドレール8cによって規制した状態で、昇降板1-3を以下に述べる手段によって昇降させることにより、実施が可能である。

【0031】保持ローラ18は、金型1が前進通路2aを経て抜取工程の終端近くに達し、金型1の通過位置が可なり下降してきたとき、金型1の昇降板1-3の下面が接触干渉を生じる場所に設置される。接触干渉が開始された後、金型1の下降がさらに進捗するにつれて、金型1の内蔵する突出ピン16の先端突出量が増加し、成型品Aの抜取作業が進行する。保持ローラ18の設置場所としては、たとえば後進通路2cの頂部や支持材などの利用が可能である。

【0032】つぎに上記構成からなる本実施例に係る製造装置によって、成型品の一例としてのハニカム構造の成型品Aを連続して製造する態様について以下に説明する。図示の製造装置を作動することにより、複数の金型1よりなる無限軌道式の行列が循環行程に沿う稼働を開始する。前進通路2aの上流側に設けられた押出式の固溶体注入装置3により、該装置3の設置地点を通過する金型1に対して上端開放部より個別に固溶体(たとえば、塩化ビニール樹脂溶液)の注入が行われる。続いて固溶体注入装置3のすぐ下流側に設けられた加圧装置4により、押圧ローラ4aを介して凝固が始まる前の固溶体(合成樹脂溶液)に対して頂部から均等に加圧する。この場合の加圧の程度は、金型1に設けられた空隙内に形成される多数の筒状のハニカム成型品部の1つずつが、頂面に帯状の平板として形成される頂部A1によって、すべてのハニカム成型品を一体的に結合でき、連続成型体(図2の成型品を上下逆向きにして接続した形態)としての取り扱いが可能で、しかもなるべく厚さの薄い連結板(頂部)A1ができる程度の圧力とし、連結板としての頂部A1の厚さは加圧装置4のそなえるハンドルによって任意に調整することが可能である。

【0033】この間を通じて前進通路2aに整列した最初の第1個から第5個までの金型1に対し、一対のブー

スタ5a、5bによって金型1の下面にそなえるラック1aと噛み合う歯車6a、6bを使って前記5個の金型1に対し、各金型1の間に相互に密着させる方向の押付力を負荷することによって、押出注入時の圧力による各金型1間の接触面からの合成樹脂溶液の漏出が防止される。

【0034】つぎに、合成樹脂溶液が冷却されることにより凝固が始まるとともに、成型品Aからの金型1の抜取工程が行われる。前進通路2aの左右両側面に設けられるガイドレールのうち、外側ガイドレール8bは型枠1-1のそなえる外側ローラ1bの高さ位置を規制し保持するためのものであり、内側ガイドレール8cは型枠1-1のそなえる内側ローラ1cの高さ位置を規制し保持するためのものである。このように型枠1-1のそれぞれのローラの高さ位置を保持することにより、金型1が抜取工程を通過中に金型1の移動方向に沿う中心軸の状態を該移動の間を通じて個別に水平状態に継続して保持することができる。それと同時に、型枠1-1の移動通路が前記ガイドレールによって規制されていることを利用して、型枠1-1の下方部分に昇降自在に設けた昇降板1-3を外側から昇降させることにより、型枠1-1と昇降板1-3との間の隙間wを強制的に増減して、成型品Aから金型1を下方へ抜き取るための手段としている。

【0035】金型1の抜取工程において、成型品Aから金型1を下方に向かって離脱する作動を強制するための手段として、本実施例で用いられている構成はつぎの通りである。

【0036】(a) 金型1の構成として下方部分に昇降自在の昇降板1-3を設けている。

【0037】(b) 昇降板1-3の昇降に応じて、金型1の型枠1-1と成型品Aとの間で作動するコイルバネ15と、出没可能な突出ピン16とを設けている。

【0038】(c) 抜取工程の終わりに近い箇所に、金型1の昇降板1-3の下面と接触干渉する保持ローラ18を設けている。

【0039】このような構成をそなえる本実施例では、発動される金型1と成型品Aとの離脱の作用を、合成樹脂溶液の固溶の状態が初期の比較的高温の状態では流動性のある時の作用と、固溶の状態がやや凝固状態に進行しつつある時の作用との二段階に分けて行われる。まず第一段階で、合成樹脂溶液と接触している突出ピン16を、コイルバネ15の弾発力と昇降板1-3の自重とによって下方に向かって引き抜く。つぎに、第二段階でガイドレールに規制されてP矢の方向(図4参照)の下降を続行中の型枠1-1に対し、別に設けた保持ローラ18によって昇降板1-3の下降をストップすることにより、相対的に型枠1-1の頂面に対して突出ピン16を突出させるので、型枠1-1に嵌まり込んでいる成型品Aは、強制的に型枠1-1の外に抜き取られる。このよ

うに、金型1の抜取工程を二段階に分けて、合成樹脂溶液の凝固の進行状態と平行してそれぞれの段階に適切な作用と組み合わせて実施することにより、きわめて合理的で高効率の抜取工程が自動式に行われることになる。

【0040】前記抜取工程の終端部において、金型1の進路を規制していた外側ガイドレール8bならびに内側ガイドレール8cは、いずれも終端部直前の位置ですでに切り取られており、保持ローラ18による干渉も同じくこの直前の位置で接触を断たれているので、前記終端部に達した金型1は、近接を感知した信号によって上昇してきたシリンダ9によって確実にその上面に受け取られ、これを後進通路2cの入口高さまで下降させたのち、シリンダ13によって後進通路2cの入り口に送り込まれる。後進通路2cは後進方向に向かって僅かに下り坂の傾斜を持っており、後進通路2c内の金型1は、自重により自走式に後進させることができるので、別に移動手段を設ける必要がなく、動力節減に寄与する。後進通路2cを通過して上昇通路2dに達した金型1は、シリンダ10によって確実に受け取られ、これを前進通路2aの入口高さまで上昇させられる。

【0041】シリンダ11とシリンダ12とは、前進通路2aの両端に位置する2個の金型1の間に挟まれるすべての金型1を、循環工程の移動中に前後から相互に密着方向に押し付けることによって、循環工程の途中において行われる下降工程における金型1の離脱あるいは上昇工程における金型1の参入等の各作動に対し、金型1の循環移動の円滑性を妨げないで装置の運転を続行可能とする作用については、さきに説明した通りである。

【0042】この発明の製造装置によって製造される成型品Aに使用される材料としては、たとえば、塩化ビニールやポリエチレンなどの高分子化合物を含む材料を、120℃～70℃の温度で固溶体化したものが一例として挙げられる。

【0043】続いて、本発明の別の実施例に係る製造装置を図面にに基づき説明する。図5は他の実施例に係る成型品の連続製造装置の概要を示す全体図、図6は図5の製造装置によって製造される成型品の他の一例としてのハニカム構造の成型品を示す斜視図、図7(a)は図5中のVII-VII線位置における金型とその周辺の断面図、図7(b)は図7(a)のII-II線で切断した断面図であり、図8は図5中のVIII-VIII線位置における金型とその周辺の要部の断面図である。

【0044】製造する成型品A'は、図6に示すように上端が開放した六角形状の各筒壁A2の上部にU字状の切欠き部A3を設けたところが、先の実施例のハニカム構造の成型品Aと異なるところである。切欠き部A3は、対象とする芝生駐車場の芝生の根が横方向に伸びるのを阻害しないように設けてあるもので、種類が異なる芝生に使用するためである。このため、金型1'も成型品A'に対応して切欠き部A3の位置に連続する型部を

設けているところが金型1とは相違しているが、基本的には共通する。

【0045】本例の製造装置が第1実施例と相違するところは下記の点である。すなわち、図5・図7・図8に示すように、一対の保持ローラ18'を昇降板1-3の下面で長さ(進行)方向の中間位置において幅方向に間隔をあけて配設し、内外のガイドレール8a・8bを配設する位置付近に水平なレール19を支持フレーム20を介して敷設している。一方、制限ボルト14の周囲のコイルバネ15を省くとともに、突出ピン16を成型品A'の筒壁A2の位置を下方から押し上げるように配置している。これは、突出ピン16で成型品A'を押し上げる際に、押し上げる力が強くなっても成型品A'に損傷を与えないように、強度の大きな箇所を押し上げるためである。また、保持ローラ18'を昇降板1-3の下面中間位置に設けたのは、金型1'の下降通路2bで、下方に敷設されたレールから保持ローラ18'が外れた際に金型1が周辺の部材と摺接することなくスムーズに下降できるようにするためである。

【0046】後進通路2cは、本例では内外のローラ1b・1cの走行用ガイド軌道21が水平に配設され、その代わりにガイド軌道21の下方に沿って搬送用ベルトコンベヤ22が配備されている。ベルトコンベヤ22の上位回走部(ベルト)22aに昇降板1-3の下面の幅方向の中央部が接触し、ベルト22aの回走にしたがって上昇通路2dの下端に金型1が搬送される。また、ベルトコンベヤ22による金型1の搬送を確実にするため、中間板1-2から昇降板1-3を下方へ離間させるための工夫を施している。すなわち、昇降板1-3の両側面の中央にベアリングローラ23を回転自在に軸着し、下降通路2bの下端で後進通路2cの入口付近に、図1のように傾斜ガイド部24を設け、この傾斜ガイド部24の傾斜辺に沿ってベアリングローラ23が案内されることにより、昇降板1-3が中間板1-2から強制的に下方へ離間して間隙があくようになっている。また、上昇通路2dの上端で前進通路2aの入口付近にも同様な傾斜ガイド部25を設け、シリンダ10で押し上げられた昇降板1-3のベアリングローラ23が傾斜ガイド部25に案内され、昇降板1-3が中間板1-2から強制的に下方へ離間されるようになっている。

【0047】上記したところが第1実施例の製造装置との主な相違点であるが、その他の構成については共通しているので説明を省略する。ここで、第2実施例に係る製造装置について、ハニカム構造の成型品A'を連続して製造する態様について以下に説明する。

【0048】基本的には上記第1実施例による製造態様と共通しているが、金型1の型枠1-1内に合成樹脂溶液が押出注入装置3から充填され、加圧装置4の押圧ローラ体4aにより凝固が始まる前の合成樹脂溶液に対して頂部から均等に加圧され、頂面に帯状の平板として形

成される頂部A1によって一体的に結合され、連続成型体(図2の成型品を上下逆向きにして接続した形態)が連続して成型される。この間を通じて前進通路2aに整列した第5個の金型1に対し、一対のブースタ5a、5bによって金型1の下面にそなえるラック1aと噛み合う歯車6a、6bを使って前記5個の金型1に対し相互に密着させる方向の押付力が負荷されることによって、押出注入時の圧力による各金型1間の接触面からの合成樹脂溶液の漏出が防止される。

【0049】このようにして金型1'が図5の左方向に搬送される間に、合成樹脂溶液が冷却されることにより凝固が始まるとともに、続いて成型品A'からの金型1'の抜取工程が行われる。上記したように前進通路2aの長さ方向のほぼ中間位置からレール19が設けられており、歯車6a・6bの噛合回転により搬送されてきた金型1'は、昇降板1-3の下面に設けた保持ローラ18'がレール19に接触し、保持ローラ18'が回転しながら金型1'が搬送される。内外のガイドレール8b・8cに案内され、金型1の型枠1-1および中間板1-2が水平に保持されつつ徐々に下降して行く(高さの位置を下げていく)。一方、昇降板1-3の下面の保持ローラ18'がレール19に接触して走行しているから、昇降板1-3の上下方向位置は一定に維持されているため、金型1の型枠1-1および中間板1-2に対し昇降板1-3が接近し、多数の突出ピン16が成型品A'の筒壁A3の位置を下方から押し上げるので、成型品A'が金型1'の型枠1-1から抜き出される。いいかえれば、成型品A'の上下方向の位置は変化せず水平に図5の左側へ移動するので、金型1'が成型品A'から抜き取られることになる。

【0050】そして、金型1'の保持ローラ18'がレール19を外れ、金型1'は下降通路2bに沿ってほぼ水平に維持された状態(保持ローラ18'が金型1'をほぼ水平に保持する機能をもつ)で落下する。金型1'の内外のガイドローラ8b・8cがガイド軌道21上に載置されると同時に、ベアリングローラ23が傾斜ガイド部24で案内されて昇降板1-3が下方に離間し、ベルトコンベヤ22の上位ベルト回走部22aに接触し、ベルトコンベヤ22によって金型1'が後進通路2cを搬送される。それから、シリンダ10により金型1は上昇通路2dに沿って上昇され、前進通路2aの始点に戻るが、このときベアリングローラ23が傾斜ガイド部25に接触して案内され昇降板1-3が下方に離間し、元の状態に復帰する。上記の動作が繰り返し継続して行われ、複数の金型1'は順次循環され成型品A'の連続体が製造される。

【0051】上記の本発明の実施例について説明したが、たとえば金型1・1'は型枠1-1の下面に中間板1-2を固定した一体構造の金型本体とし、この金型本体の下面に対し昇降板1-3を所定の範囲内で接離可能

に組み合わせることができる。

【0052】

【発明の効果】以上の説明から明らかなように、この発明に係る成型品の連続製造方法および同製造装置には、つぎのような優れた効果がある。

【0053】(1) 請求項1の製造方法では、固溶体の押し出し方式の適用と、複数の金型の循環による連続流れ方式の適用とが、ともに可能となり、その結果、大量生産体制を実現することができるので、従来の製造方法(主に射出成型方法)によって製造する場合とくらべて、製造スピードの促進と成品コストの引き下げが実現される。

【0054】(2) 請求項2の製造装置では、請求項1に係る製造方法を確実に実施できるほか、定形の金型を複数個容易し、それらを循環させることにより連続して成形できるので、金型の製作費が比較的安価になるとともに、ガイド手段によって金型を漸次下降させるのに逆向きに対応して複数の突出ピンを金型のキャビティ内に突出させて冷却固化した成型品を抜き取るので、確実に型抜きが行われる。

【0055】(3) 請求項3の発明では、製造工程の途中で成型品の凝固が始まるときと、成型品から金型を抜き取る工程にあるときの金型の姿勢を、常に水平方向の姿勢に保持することができる。その結果、成型品の形状の不揃いがなくなっていくわゆる見栄えのよい成型品が得られることと、成型品から金型を下方に向かって抜き取るとき、滑動する摩擦面の方向が鉛直方向と合致するので、抜き操作が極めて容易に行われる。

【0056】(4) 請求項4の発明では、成型工程中のある特定の区間において固溶体の注入が行われるが、そのとき注入圧力によって隣接する前後の金型間の接触面が離間してその間に隙間が生じたり、その隙間から固溶体が外部に漏れ出るなどのおそれが確実に防止でき、固溶体の注入操作を安全確実に実施することが可能となる。

【0057】(5) 請求項5の発明では、金型の循環通路中の上方の位置にある成型工程のすべての金型に対し、その前端面と後端面との間を前後から相互に密着方向に押し付けることにより、循環工程の途中において行われる下降時における金型の離脱、あるいは上昇工程における金型の参入等の各作動に対し、金型の循環移動の円滑性を妨げることなく、装置の運転を安全に続行することが可能となる。

【0058】(6) 請求項6に発明では、金型の構造が簡単で、中間板に対し昇降板が所定の範囲内で接離可能に組み合わせられ、キャビティ内に突出ピンが出没する構造からなるから、取り扱いが容易で、成型品の抜き出しも容易に行われる。

【0059】(7) 請求項7記載の発明では、請求項3記載の装置による作用に加えて、昇降板が保持ローラ



とレールとの協同作用によって水平に維持されつつ前方へ送られる間に、型枠と中間板とが同時にガイドレールに沿って下降してくるので、昇降板に植設された複数の突出ピンがキャビティ内に徐々に突出していき、成型品が金型の型枠から抜き出される。

【0060】(8) 請求項8記載の発明では、前進通路の終点位置まで搬送された金型を昇降機構で下降させ、水平なガイド軌道に沿ってベルトコンベヤによって終端まで搬送したのち、昇降機構によって金型を前進通路の始点位置まで確実に戻ることができる。

【図面の簡単な説明】

【図1】本発明の第1実施例に係る成型品の連続製造装置の概要を示す全体図である。

【図2】は図1の製造装置によって製造される成型品の一例としてのハニカム構造の成型品を示す斜視図である。

【図3】図3(a)は図1中のIII-III線位置における金型とその周辺の断面図、図3(b)は図3(a)のI-I線で切断した断面図である。

【図4】図1中のIV-IV線位置における金型とその周辺の要部の断面図である。

【図5】本発明の第2実施例に係る成型品の連続製造装置の概要を示す全体図である。

【図6】図5の製造装置によって製造される成型品の他の一例としてのハニカム構造の成型品を示す斜視図である。

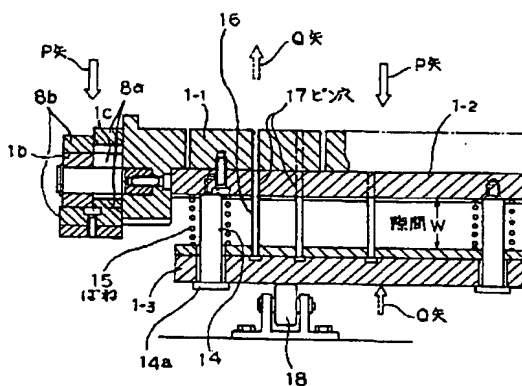
【図7】図7(a)は図5中のVII-VII線位置における金型とその周辺の断面図、図7(b)は図7(a)のII-II線で切断した断面図である。

【図8】図5中のVIII-VIII線位置における金型とその周辺の要部の断面図である。

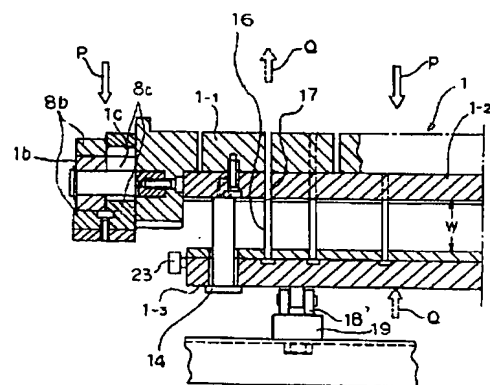
【符号の説明】

- 1・1' 金型
- 1-1 型枠(金型本体)
- 1-2 中間板(金型本体)
- 1-3 昇降板
- 1a ラック
- 1b 外側ローラ
- 1c 内側ローラ
- 2 循環通路
- 2a 前進通路(往路)
- 2b 下降通路
- 2c 後進通路(復路)
- 2d 上昇通路
- 3 押出体注入装置
- 4 加圧装置
- 4a 押圧ローラ
- 5a・5b ブースタ
- 6a・6b 歯車(ピニオン)
- 7a・7b モータ
- 8b 外側ガイドレール
- 8c 内側ガイドレール
- 9, 10, 11, 12, 13 シリンダ(昇降機構)
- 14 制限ボルト
- 15 コイルバネ
- 16 突出ピン
- 17 ピン穴
- 18・18' 保持ローラ
- 19 レール
- 21 ガイド軌道
- 22 ベルトコンベヤ
- 23 ベアリングローラ
- 24・25 傾斜ガイド部
- A・A' 成型品

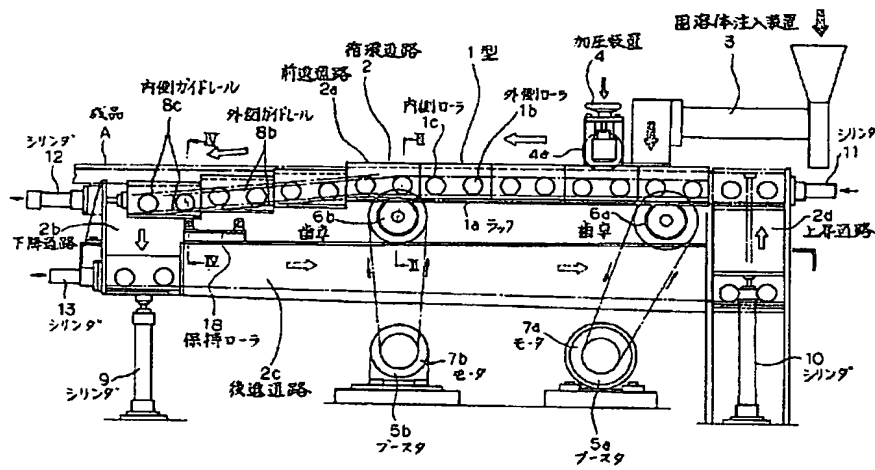
【図4】



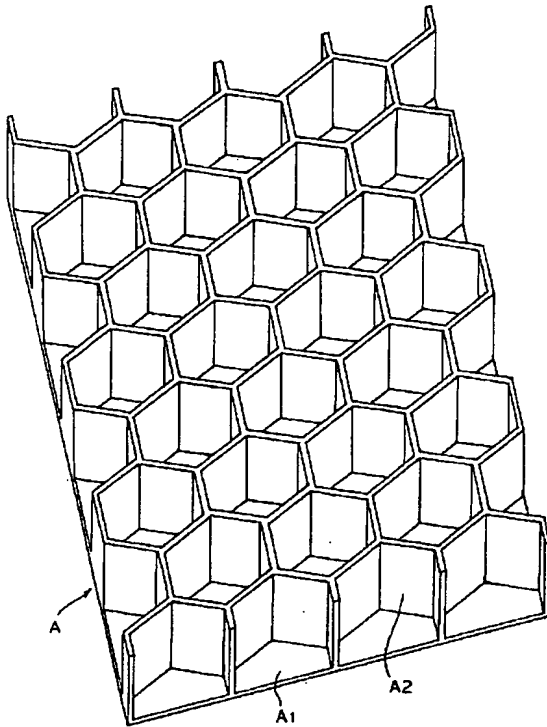
【図8】



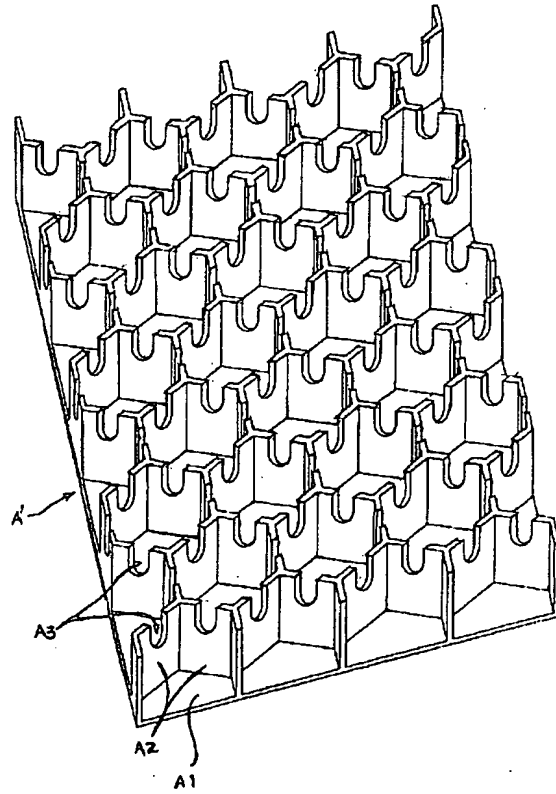
【図1】



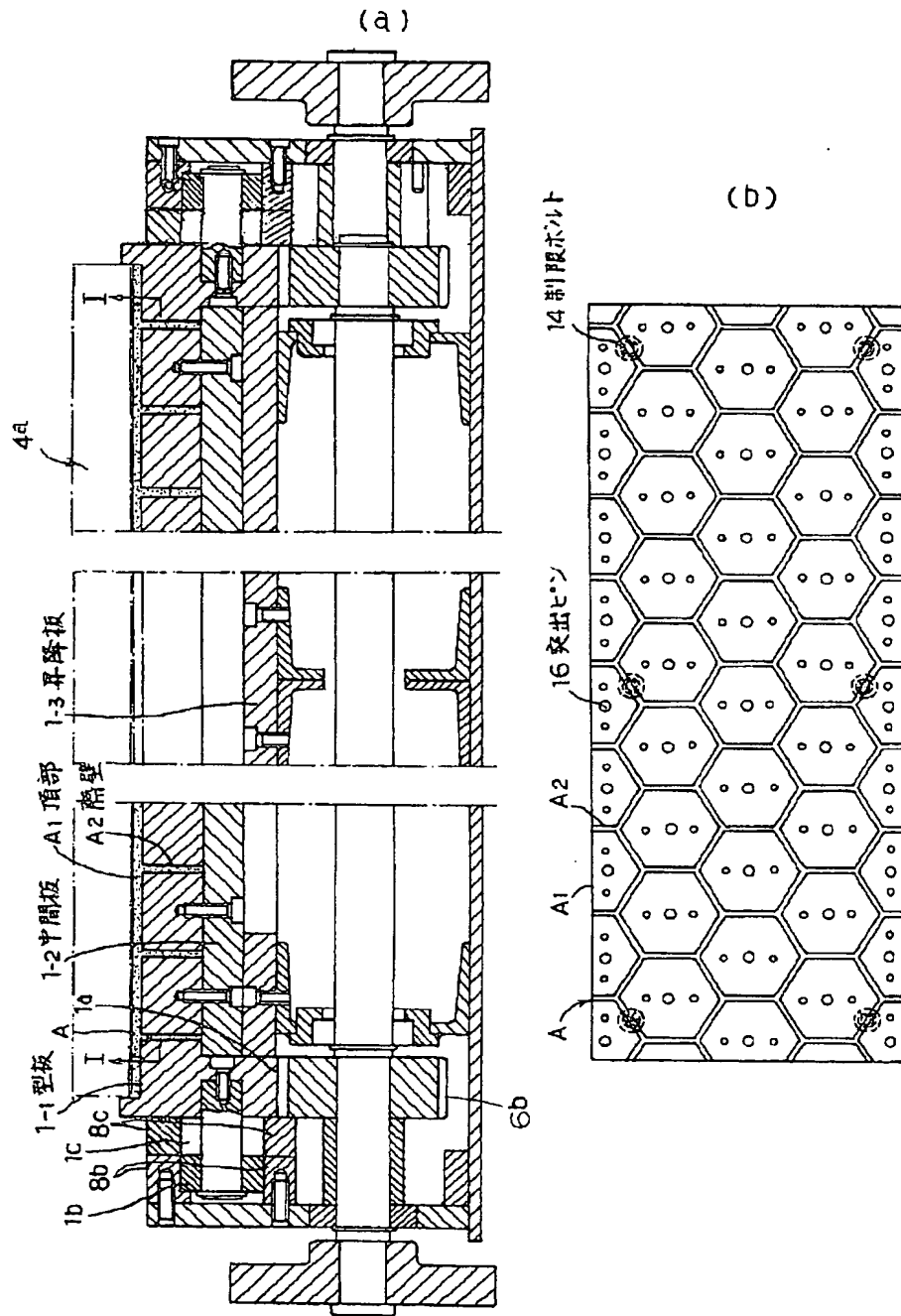
【図2】



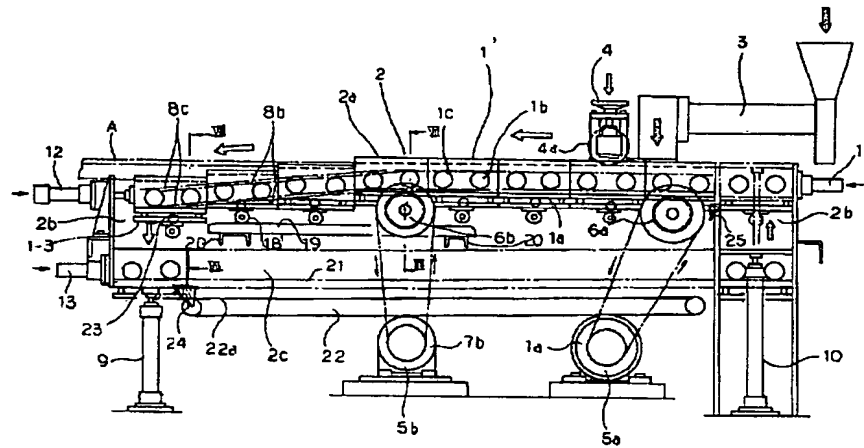
【図6】



【図3】



【図5】



【図7】

